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THE HISTORY AND LITERATURE OF SURGERY.

By JOHN S. BILLINGS, M. D.

In this sketch of the development of Surgery during the last three thousand years a brief account is given, mainly in chronological order, of the chief discoverers, improvers, and inventors in the art, and also of the principal teachers of it. The original inventor may or may not have been a lecturer or author, and the date of the first improvement in a method of treatment or in the performance of a new operation was often long prior to that general knowledge of such improvement which is necessary to constitute true development. Some account is also given of the trade, guild, or craft associations or corporations of surgeons, and of their relations to education and to legislation. A few illustrations of the state of the art at different periods, in the shape of the recommendations of different writers with regard to methods of treatment of certain injuries or diseases, are presented; but no attempt is made to trace the history of the growth of knowledge with regard to each particular form of disease or operation, this being left to the writers of monographs on these particular subjects.

It requires leisure, patience, and access to a large library to make historical studies really interesting, and the most I can hope to accomplish in this paper is to furnish to the physician who has little time, taste, or opportunity for consulting the original documents the means of ascertaining the periods and places in which the leading surgeons of the world have done their work. The printed literature of surgery is vast in quantity, and the great majority of it is obsolete and practically useless: even for statistical purposes the records of operations performed prior to 1870 have now lost much of the value which they possessed at that date; yet in many respects the old surgical monographs, collections of cases, and systems are the most definite and interesting of all ancient medical literature.

To really enjoy the history of surgery it is necessary to consult the original documents—to get the flavor of the quaint phraseology of the older writers. No discourse about the surgical knowledge of Hippocrates, however eloquent and eulogistic it may be, can give such an idea of his teachings as is to be obtained from a perusal of his writings.

It is not to be expected that a man who is familiar with the resources of the surgery of the present day will be able to discover in the ancient records anything of much practical utility in his daily work which will be new to him; nevertheless, if he desires to compare his experience in a particular case or class of cases with that of his predecessors—to obtain,

as it were, a sort of "parallax in time" of the views which have been held on the subject which occupies him—he will often not be able to do this from the current text-books. It will be necessary that he should go back to the old masters, read, compare, and think; and whenever he does this it is safe to say that his conclusions will be broader, wiser, established on a firmer foundation, and more interesting to those to whom he imparts them, than they will be if derived solely from his own experience.

In the history of the development in civilization of nations and peoples, surgery almost necessarily precedes internal medicine with regard to accurate observation of lesions of the human body and of their results. Speculations about humors and fluxes, black bile and medical constitutions, vital spirits and the doctrine of signatures, did not much occupy the minds of the men of old in their attempts to note and describe the signs of different forms of fractures and dislocations, the danger of wounds in different localities, the different varieties of tumors, or the treatment of a calculus in the bladder or of a hernia. Of the many remedies in the form of drugs, salves, embrocations, and plasters which are described at length in the ancient medical books which have come down to us, hardly more than twenty are now in ordinary use; the ancient physiology and pathology are, for the most part, now considered as being merely curious illustrations of human error; and it is only a portion of the anatomy and surgery of the ancients that remains as an essential part of the foundation of the art of medicine as it exists to-day.

The history of surgery is inextricably mingled with that of medicine, and the best literature on the subject is to be found in some of the larger formal treatises on the history of medicine. It has, however, been treated of as a special branch of the art in a goodly number of books and essays, the titles of a portion of which fill seven pages of volume xiii. of the Index Catalogue of the Library of the Surgeon-General's Office at Washington.

The earliest records in our possession which relate to surgical operations come from Egypt. It is true that human skulls have been found belonging to the Neolithic or Polished Stone Age, which have had portions removed—being examples of the so-called prehistoric trephining which is supposed to have been performed in cases of headache, epilepsy, etc.—and the age of these relics is unknown; but it is not at all probable that it extends to the time of the pyramid-builders in the valley of the Nile, when circumcision had been established as a religious rite and an official system of medicine was in process of construction.

The Papyrus Ebers, written 1552 B. C.—that is, at least a century before the exodus of the Israelites—is a compilation of receipts and directions for the treatment of various diseases, many of which formulæ it refers to as being then ancient. Among these is a short section on tumors near the surface of the body, in which it is said: "If this tumor goes and comes under your finger, trembling even when your hand is still, say, 'it is a fatty tumor,' and treat it with the knife, after which treat it as an open wound." From the Papyrus Ebers we learn that there were physicians in Egypt who were not priests, and the same may be inferred from the statement in Genesis (ch. l. 2) that "Joseph commanded his servants the physicians to embalm his father, and the physicians embalmed Israel." The word in this text which is translated "physicians" is *rephaim*, and it is sometimes translated as "dressers of wounds"—*i. e.* surgeons. The embalmers probably had a little more anatomical knowledge than the physicians of the time; but the Egyptians had a treatise on anatomy which, according to Manetho, was attributed to Athothis, the son of Menes, who reigned 5241 B. C.

The few allusions to medicine scattered through the books of the Old Testament indicate that the general belief was in accord with that usually found prevailing among savage tribes—viz. that most diseases are punishments inflicted by divine power, and to be removed by sacrifices and special ceremonies; whence it follows that the priests were the chief medicine-men. That there were other physicians is probable from the grimly sarcastic account of King Asa, who "in his disease sought not to the Lord, but to the physicians. And Asa slept with his fathers;" and also, perhaps, from Exodus xxi. 19: "And if men strive together, and one smite another with a stone, or with his fist, and he die not, ... then shall he that smote him pay for the loss of his time, and shall cause him to be thoroughly healed;" or, as the Septuagint has it, "and shall pay the physician's fees."

The medicine of the Bible has been the subject of several learned essays, but it does not appear that medicine was regularly studied among the Jews as a separate profession until the rise of the Alexandrian School, nor does either the science or the art of medicine owe anything to this nation until after this period. The often-quoted chapter xxxviii. of Ecclesiasticus about the physician is of late date, and was probably written under Greek influence.

Some specimens of Jewish surgery prior to 200 A. D. are to be found in the Talmud. The rabbis were acquainted with sutures for wounds, with the method of freshening the edges of an old wound to obtain reunion, with the employment of the uterine sound to learn whether the blood came from the uterus or vagina, the operation for imperforate anus, and also with anæsthetic substances with which they used to diminish the pain of a surgical operation or capital punishment.[1] They understood the application to the body of artificial parts, as for supplying the loss of substance of the trachea and replacing the loss of substance of the cranial bone; they knew artificial teeth, wooden legs, as also various forms of apparatus for the unfortunates who were deprived of the use of their lower extremities.

The first allusions to surgical subjects in Greek literature are found in the poems of Homer, which may be accepted as dating from about 1000 B. C., whatever may be thought as to the reality of the siege of Troy or the identity of Homer himself. In these poems mention is made of Æsculapius, not as a god, but as a well-known and distinguished physician, and of his sons Machaon and Podalirius as surgeons and warriors. The works of Homer have been carefully examined and analyzed by Malgaigne and Daremberg with reference to medical and surgical matters, and their conclusions may be briefly stated as follows:[2]

[1] Rabbinowicz: *La Médecine du Thalmud, etc.*, Paris, 1880, p. xliii.

[2] "Essai sur l'Histoire et l'Organisation de la Chirurgie et de la Médecine grecques avant Hippocrate," par M. Malgaigne, *Jour. de Méd.*, iv. 303, Paris, 1846; *La Médecine dans Homère*, par Ch. Daremberg, 8°, Paris, 1865.

Among the Greeks were certain surgeons whose knowledge and skill were highly esteemed; many of the warriors knew how to dress and bandage wounds, and some of the Grecian women had the same skill, corresponding to that possessed by the wives of the nobility in Western Europe in feudal times. The dressings applied to the wounds appear to have been for the most part simple emollients: the effused blood was pressed out, the surface was washed with warm water, certain crushed roots or bruised leaves were applied to check hemorrhage. Over forty wounds in different parts of the body are described with more or less detail, and in such a way as to indicate that Homer gave the results of actual observation and experience; and in the course of these descriptions a nomenclature is used which, anatomically, is much the same as that employed by Hippocrates. The different effects of wounds in different parts of the body are referred to, and a curious illustration of this occurs in the description of the injury of one of the horses of Nestor by an arrow from the bow of Paris (viii. 81–86). The wound was on the top of the head, penetrating to the brain, and it is said that the injured animal was convulsed and turned round and round the pole. This, as Malgaigne points out, corresponds to the modern discovery that such movements of rotation are produced by an injury of the cerebellum.

The anatomical terms used by Homer relate mainly to the exterior of the body, and do not imply any greater knowledge of internal structure than is possessed by every butcher; but his allusions to the fatality of certain wounds embody the results of considerable experience. There is nothing of surgical interest in Greek literature between the time of Homer and that of the Hippocratic Writings, unless it be the passage in Aristophanes in which the slave of Lamachus calls for hot-water compresses, etc. with which to dress the sprained ankle of his master.

In the fifth and sixth centuries B. C. there were in Greece and Great Greece between fifty and sixty temples of Æsculapius, all of which were probably resorted to by the sick, but those which became specially celebrated were those of Rhodes, Cyrene, Cnidos, and Cos. Those at Cnidos and Cos gradually became the most famous, and their so-called "schools" occupy a prominent place in the history of medicine.

By the term "medical schools" as applied to Cos and Cnidos it is not meant that these were places for the public teaching of medicine, but rather that they were places where certain medical families had settled, and in each of which certain peculiar theories and methods of treatment prevailed, the phrase "school" being used much as we would now speak of the "French" or the "Munich" school in painting.

In the vicinity of these temples there seem to have collected physicians who were not priests, and who belonged to an association or brotherhood, the members of which either claimed to be descendants of Æsculapius or were admitted to the guild by adoption with special ceremonies. These were known collectively as the "Æsclepiadæ," and much confusion has arisen from the erroneous application of this term in later times to those who ministered in the temple. There is no doubt that the priests of the temple gave medical advice, but, if we are to judge from the specimens preserved to us in the forms of inscriptions and memorial tablets, it was not the sort of advice of which any use is made in the medical treatises of the Hippocratic school.

It is probable that the real or lay physicians kept records which were handed down from father to son, and were preserved as a valuable family heritage. That medicine was thus hereditary we know from the Hippocratic oath, and from the genealogies which are given of many of the celebrated physicians of Greece. According to Bertrand, this custom has come down to the present time. On one of the slopes of Pindus there are still five or six villages the inhabitants of which are supposed to be born physicians and surgeons, each family having its own specialty and its inherited tradition. If a son is wanting, the child of a stranger is adopted.

There is no evidence that those who visited the temples seeking miraculous cures were examined or treated by lay physicians, but there were certain attendants called *zacoroi* who received the patients and assigned them to places beneath the porticos; and from the information collected by them it is possible that the priest who impersonated the god, appearing in the night-watches, may sometimes have formulated his prophecies and instructions.

The doctrines of the schools of Cos and Cnidos were committed to writing, the first work of the kind coming from the school of Cnidos, being what is known as the "Cnidian Sentences." Of this treatise there were at least two editions, and it was in existence in the time of Galen. A portion of it has been preserved to us in what are known as the Second and Third Books of Diseases, and in the Treatises on Internal Affections contained in the Hippocratic collections.

In this portion four diseases of the kidneys are described. In the first there is acute pain in the loins, groin, and the testicle of the affected side (renal colic); there is frequent urination, with gradual suppression of urine and passage of sand, causing pain in the urethra. Apply warmth and purge with scammony. If the pain is great, use large enemata of warm water; if a tumor forms, make an incision over the kidney and evacuate the pus. Such incision gives a chance of recovery; without it death will follow.

In the second form of disease of the kidney there are violent pains, as in the preceding form. The patient passes blood with his urine at the commencement of the disease, which is followed, after a time, by pus. If he preserves a strict rest, he will be cured rapidly, but if he makes effort, the pains will become sharper. When the kidney is filled with pus it swells out near the spine; in this case make, over the swelling, an incision, generally deep, into the kidney. If you succeed in the incision, you will cure the patient at once; if you fail, it is to be feared that the wound will not close, and the borders of the wound will contract and the cavity of the kidney will be filled with pus; if this passes inward and is evacuated by the rectum, there is a chance of health; but if it affects the other kidney, death is to be feared. Evacuants are to be used, and the same regimen as for the preceding case. Very often this disease terminates by a renal phthisis.

The school of Cos followed with its collection of maxims, the "Prænotiones Coacæ." Its doctrines will be best considered in the work of its most illustrious disciple, Hippocrates, who was born at Cos about 460 B. C. His father, Heraclides, and his grandfather were physicians, and he received his early education at the school of Cos, after which he went

to Athens and continued his studies, receiving the best education which the Golden Age of Greek civilization could furnish.

The collection known as the "Hippocratic Writings" dates from a period about the time of Aristotle. Only a portion of these writings are the works of Hippocrates himself; several are probably of more ancient date—two at least appear to belong to the Cnidian School, and some are by his disciples. On the other hand, some of those which once belonged to this collection have been lost.

The books in the Hippocratic collection which treat more especially of surgical affections and operations, and which are accepted by most commentators as having been written either by Hippocrates himself or by one of his immediate pupils, are those on injuries of the head, on fractures, on the articulations (*i. e.* on dislocations), Mochlicus (on the bones and their injuries and displacements, and on apparatus), on wounds and ulcers, on fistulæ, on hemorrhoids, and on the Iatrium or the Physician's Establishment, or the Surgery.

The book on injuries of the head begins with a description of the sutures of the cranium and of the bones of the skull, in which it is stated that the number and position of the sutures varies with the form of the head; that the coronal suture is wanting when there is no anterior protuberance of the skull, and the lambdoid suture is wanting when there is no posterior protuberance. As this does not agree with the observations of modern anatomists, the commentators have much trouble to explain it, since they are unwilling to admit that Hippocrates made a mistake in observation, or even that he generalized from insufficient data; which last is the most probable explanation.

He divides injuries of the bones of the skull into five classes—viz. simple fissures, contusions without fracture or depression, fractures with depression, indentations of the outer table, and fractures at a distance from the place of injury, or fracture by contre-coup. With regard to this last he says: "There is no remedy, for when this mischief takes place there is no means of ascertaining by any examination whether or not it has occurred, or on what part of the head." He then goes on to say: "Of these modes of fracture the following require trepanning: the contusion, whether the bone be laid bare or not; and the fissure, whether apparent or not. . . . . A bone depressed from its natural position rarely requires trepanning, and those which are most pressed and broken require trepanning the least."

It will be seen that this is quite different from the rules of modern practice.

For wounds of the head he forbids the application of any liquors or cataplasms or tents, unless the wound is on the forehead or the part which is bare of hairs or about the eyebrow and eye. The wound is to be extended by incisions for the purpose of examining the bone whenever it is suspected that this is injured; and it is remarked that these incisions may be practised with impunity except on the temple and the parts above it, where there is a vein that runs across the temple, in which region an incision is not to be made; "for convulsions seize on a person who has been thus treated; and if the incision be on the left temple, the convulsions seize on the right side; and if the incision be on the right side, the convulsions take place on the left side."

The books on fractures and on the articulations, together with the book called "Mochlicus," contain sketches of the anatomy of the bones and of the joints, and accounts of various forms of dislocations of the different joints, with detailed instructions as to reduction and as to the mode of bandaging in cases of fracture. Special attention is given to the subject of injuries affecting the knee-, the elbow-, and the ankle-joints.

The paragraph on dislocations of the knee does not correspond to the experience of modern surgeons. It is as follows: "Luxations and subluxations at the knee are much milder accidents than subluxations and luxations at the elbow; for the knee-joint, in proportion to its size, is more compact than that of the arm, and has a more even conformation, and is rounded, while the joint of the arm is large and has many cavities. . . . .

"Owing to their configuration, the bones of the knee are indeed frequently dislocated, but they are easily reduced, for no great inflammation follows nor any constriction of the joint. . . . . They are displaced for the most part to the inside, sometimes to the outside, and occasionally into the ham. The reduction in all these cases is not difficult, but in the dislocations inward and outward the patient should be placed on a low seat, and the thigh should be elevated, but not much. Moderate extension for the most part sufficeth, extension being made at the leg and counter-extension at the thigh.

"Dislocations at the elbow are more troublesome than those at the knee, and, owing to the inflammation which comes on and the configuration of the joint, are more difficult to reduce if the bones are not immediately replaced. For the bones at the elbow are less subject to dislocation than those of the knee, but are more difficult to reduce and keep in their position, and are more apt to become inflamed and ankylosed."

Some of the older surgeons concur with Hippocrates in speaking of dislocations of the knee as comparatively frequent, whereas at present they are very rare. Dr. Adams supposes that the wrestlers at the public games, who furnished Hippocrates with a large proportion of his cases of fractures and dislocations, may have been especially liable to this accident. Hippocrates says that he knows of but one way in which the shoulder-joint is dislocated—namely, that into the armpit; but he does not deny that the head of the humerus might be dislocated upward, outward, or forward. The methods of reduction are fairly described, and are substantially those which are used at the present day.

He has much to say in various places about congenital dislocations, some of which may be reduced to their natural condition, and especially those at the ankle-joint.

In cases of compound dislocations he forbids reduction, as a general rule. For example, in speaking of dislocation at the ankle-joint complicated with an external wound, he says you are not to reduce the parts, but let any other physician reduce them if he choose; "for this you should know for certain, that the patient will die if the parts are allowed to remain reduced, and that he will not survive more than a few days, for few of them pass the seventh day, being cut off by convulsions; but sometimes the leg and foot are seized with gangrene. . . . . But if not reduced nor any attempts first made to reduce them, most of such cases

recover. The leg and foot are to be arranged as the patient wishes, only they must not be put in a dependent position nor moved about."

In speaking of these compound dislocations he makes no allusion to cutting off the protruding end of the bone, but in another section he remarks that "complete resections of bones at the joints, whether the foot, the hand, the leg, the ankle, the forearm, the wrist, for the most part are not attended with danger, unless one be cut off at once by deliquium animi or if continual fevers supervene on the fourth day."

Hippocrates knew nothing about amputation of limbs as an operation through living parts or with a view to forming a stump of a particular shape. In cases of gangrene due to the crushing of the blood-vessels, or following fractures when the bandages have been applied too tightly, he remarks that the most of such patients recover, even when a portion of the thigh comes away or of the arm, and when the forearm and leg drop off the patients rapidly recover.

The surgical part of the Hippocratic collection is much more in accordance with modern views than the medical part; but there are certain characteristics of all the books generally considered to have been written by Hippocrates himself which are worthy of special attention in connection with the high repute in which they have been held by medical men for over two thousand years. In the first place, it is evident that one of his special aims was to be entirely honest and truthful in his statements. He reports no marvellous cures, no specimens of extraordinary success in diagnosis where others had failed; fatal cases are given as well as recoveries, and there are no hints that the former were not seen in time or that they had been improperly treated by others. He seems to have written mainly for the purpose of telling what he himself knew; and this motive—rare among all writers—is especially rare among writers on medicine.

A second characteristic of the Hippocratic Writings is the special attention given to those symptoms which indicate the effect which the disease is producing upon the body as a whole, including such phenomena as fever, debility, delirium, restlessness, and so-called critical discharges of various kinds; while the special diagnostic signs of particular forms of disease of particular organs are given much less attention.

The aphorism of Hippocrates concerning the efficiency of fire—namely, "that diseases which are not cured by medicines are cured by iron; those which are not cured by iron are cured by fire; those not cured by fire are incurable"—has been the cause of an enormous amount of suffering and of bad surgery to nearly the present century.

Surgery of India and China.

In the literature of India the first definite hymns, invocations, and charms connected with medicine are found in the fourth (or Atharva) Veda. The oldest existing medical work is the Charaka-samhita, of which the Sanscrit text has been published in 1877, and of which an English translation is now in course of publication. Somewhat later, probably, is the Susruta, of which two Sanscrit editions have been published; also a Latin translation by Dr. F. Hessler, published at Erlangen in 1844. English translations are in progress of publication, and a summary is given by Dr. Wise in his history of Indian medicine. Both Charaka and Susruta profess to be, and are commonly said to be, commentaries on the Ayur-Veda—*i. e.* the Veda of Life—but, in fact, there is no such work as the Ayur-Veda distinct from and preceding Charaka and Susruta.

The date of composition of these works is unknown, and is variously estimated at from 1000 B. C. to 700 A. D. Recent authorities consider that the later date is the more probable one, and that the work took its present form under the influence of ideas derived from the Alexandrian School and the early Arab writers. It was certainly known in the ninth century A. D. Nevertheless, it shows little trace of a knowledge by the author of the Hippocratic Writings or of the discoveries of the Alexandrian anatomists and surgeons, and it contains a number of things peculiar to itself and probably derived from ancient Indian traditions.

The translation of Susruta by Anna Moreshvar Kunte, of which the first numbers were published in Bombay in 1877, begins as follows:

"*Salutation to Brahma, Prajapati, the twin Asvins, Indra, Dhanvantari, Susruta, and others.*

"Now, hereafter, we shall narrate the chapter named the descent of knowledge (of medicine) just as it was taught to Susruta by the venerable Dhanvantari. Aupadhenava, Vaitarana, Aurabhra, Paushkalavata, Karavirya, Gopura, Rakshita, Susruta, and his other friends in earnest addressed the venerable Dhanvantari, the respected of gods (then known by the name of Divodasa), the descendant of Kasiraja, who was leading the life of a hermit, surrounded by a number of sages: 'Sire! we are moved with compassion, seeing human beings, though protected (by their kings), yet quite helpless, being afflicted with numerous bodily, mental, natural, and accidental maladies. We wish to be instructed in the Science of Medicine for the sake of public good, for earning our livelihood, and for allaying the sufferings of mankind desirous of health. Earthly and heavenly bliss depends upon it. Hence, Sire, we have come to you to become your pupils.'

"To them said the venerable man: 'Ye are welcome. All of you, my lads, shall be taught and made to meditate. Ayur-Veda is an Upanga of the Atharva-Veda. The Self-born, after creating the universe, composed it in a thousand chapters, containing a hundred thousand verses. But, knowing the brevity of human life and the limitedness of human understanding, he reduced it to eight divisions. These are: 1. Shalyam, splinter (extraction) surgery; 2, Shalakyam, inquiry into the disease of organs situated above the clavicles; 3, Kayachikitsa treats of diseases affecting the whole body; 4, Bhutavida treats of diseases of mind produced by demoniacal influences; 5, Koumarabhrityam, care and treatment of children; 6, Agadatantram, doctrine of antidotes; 7, Rasayanatantra, doctrine of elixirs; 8, Vajikaranatantram, rules for increasing the generative powers. Which of these do you wish to be taught?'—'Sire,' said they, 'teach us all, but begin with surgery first.'—'Be it so,' said he.—They again requested him, saying, 'Susruta, after consulting us all, shall ask you for explanations (in matters of doubt), and whilst he is made to understand we shall also try to do the same.'—'Well, then, my pupil, Susruta,' said he, 'the Science of Medicine has for its object the emancipation from disease of those who are afflicted by it, and the pres-

ervation of the health of those who possess it. Ayur-Veda is so called because by it health is gained or it brings health. The best portion of it I explain to you: try to follow me and judge by the four criteria of judgment—namely, inference, comparison, testimony, and perception. It is the best, because the first inflicted wound was healed (by its knowledge), and the head of Yajna was united to his trunk. It is said that when Rudra cut of the head of Yajna the gods went to the twin Asvins and said to them, "You two are of a higher rank amongst us. We entreat you to join together Yajna's head and trunk." They complied with the request. For their sake the gods propitiated Indra and allowed them a share in his sacrifice. They forthwith joined the head and trunk together. Of all the eight parts of which the Ayur-Veda is composed, this is the best, from the speediness of its operations, from its including the use of appliances, surgical instruments, caustics, cauteries, and from its being common to the other parts (of the science). Thus it is eternal, merit-giving, divine, leading to renown, longevity, and prosperity.

"'The great god Brahma announced (the knowledge of medicine) first; Prajapati learnt it from him; the twin Asvins got it from Prajapati; from them Indra; and from Indra have I learnt it. I am going to impart it to anybody who seeks it for the sake of public good.

"'On the preliminary preparations (rules to be observed before, during, and after the completion) of surgical operations:

"'Every action (to be successful) involves three stages—viz. 1, the preparatory stage; 2, the predominant stage; 3, the succeeding stage. We shall point out that the treatment of diseases has these three stages.

"'In this science the use of edged instruments is considered to be predominant. Hence we shall begin our description with it and its accessories. Edged instruments are used for eight purposes—viz. 1, amputating; 2, opening; 3, scarifying; 4, puncturing; 5, exploring; 6, drawing; 7, evacuating; and 8, sewing. A surgeon contemplating to operate in any of the above ways should first have ready the following: blunt instruments (forceps, etc.), sharp instruments, potential cauteries, virtual cauteries, catheters, horns, leeches, a dry gourd, a cauterizing needle, stuffing materials, strings, board, bandage, honey, ghee, fat, milk, oil, soothing decoctions, injections, lotions, fan, cold and warm water, a frying-pan, able, steady, and attached servants.

"'Then on a good day, having a good lunar influence and the auspicious influence of stars, after invoking blessings from the Brahmans and medical men, and propitiating the sacred fire with honey, rice, and water, let the patient be seated, who has taken very little food, offered sacrifices, and made ablutions, with his face toward the east. The surgeon should stand with his face toward him, and plunge his instrument after the proper incision until matter comes out, and withdraw it, avoiding vital parts, vessels, muscles, articulations, bones, and arteries. In the case of a large collection of matter the incision may be of the breadth of two or three fingers even.

"'Incisions are either long, wide, even, or uneven. An incision, whether long, broad, clean, or dependent, is always to be extolled when it suits (the purpose and) the occasion. Boldness, rapidity of action, sharp instruments, operation without trembling, fear, or doubt, are always praiseworthy of the surgeon operating. . . . . The operations for moles, ascites, piles, calculus, fistula, and mouth diseases are to be performed on an empty stomach. . . . . The instruments should be so made that they should be of a good finish, strong, clean in appearance, with good handles, whether they be sharp or blunt.

"'Among these the Svastika instruments ought to be about nine inches long; their mouths should be respectively like those of a lion, tiger, wolf, hyena, bear, elephant, cat, hare, antelope, crow, heron, dog, jay, vulture, falcon, owl, kite, cock, crouch, the bee, rat, mouse, or bullock, each half being united to the other by a nail of the form of a lentil-seed, being bent inward at the handles like the elephant-driver's hook. These forceps are recommended for the extraction of splinters lodged in bones.

"'The tubular instruments are of a variety of kinds, having various uses, open at one end or both or having several foraminæ. They are used for removing obstructions from the great canals of the body, or for examination of diseases, or as suction-tubes, or for the easy application of remedies. Their lengths are always determined by the aperture of the canal whence the obstruction is to be removed or by the use to which they are to be applied.

"'The different tubular instruments which are used in fistula, hemorrhoids, polypi, sores, urethral injections, enemas, retention of urine, ascites, inhalation for cough and dyspnœa, and obstruction of bowels, together with the bottle-gourd and the horns, shall be described hereafter in their proper places.

"'The probe-like instruments are of various kinds and serve a variety of purposes. Their magnitudes differ according to the uses they are applied to. Among them the earthworm-like probe, the arrow probe, the serpent-hood probe, and the hook probe are each of them two in number. They have been recommended for sounding, separating, loosening, and extracting (foreign bodies). Probes having lentil-seedlike ends are two. They are slightly curved inward at their extremities, and are used for the extraction of foreign bodies from the large canals. There are six probes which are capped with cotton wool, and are used for cleaning and wiping purposes. There are three which are ladle-like and mortar-like, and are used for application of caustics. Three others there are which have their ends like a jambul-seed. Three others, again, resembling the elephant hook. These six are used for cauterizing purposes. There is a nasal-polypus probe which resembles the kolasthi. There is the inunction probe, which at its both extremities has a knob like the pea-seed, resembling an open bud. There is the urinary catheter, which resembles the stalk of malati- [*Jasminium glandiflora*] flower, and its length varies according to purpose. . . . .

"'The lion-mouth forceps is for foreign bodies that can be seen, while for covered ones there is the heron forceps and others of its kind. These should be used gently, the foreign body being removed in accordance with surgical precepts.

"'The heron forceps is the best of all forceps, since its use never leads to accidents. It enters easily and is very easily drawn back. It lays a firm hold on splinters and removes them easily.'"

No allusions are made to the use of the ligature, but amputations of

the limbs were performed, the hemorrhage being checked by the cautery, by boiling oil, and by pressure.

The operation of lithotomy is described, being that of "cutting on the gripe," the incision being made on either the left or the right side of the perineum, the breadth of a barley-corn from the central line and an inch from the anus.

The suprapubic operation was also known, rhinoplasty is described, and herniotomy is referred to. Manual skill was to be acquired by the student by making punctures and incisions on gourds and other fruits or on dead animals.

Fractures and dislocations are described with considerable detail of classification, and the bamboo splints recommended are still in use. The most original thing in the work is the part which relates to plastic surgery, and especially to rhinoplasty.

Of the history of surgery in China almost nothing is known. Hwa T'o, who is supposed to have lived in the third century A. D., is ordinarily considered to have been the father of surgery in China. He is said to have performed abdominal section for the local treatment of diseased viscera; to have laid bare the scapula of a certain great military hero and scraped from it certain poison, possibly carious bone; also to have relieved by acupuncture an affection of the brain of another famous general of his time. It does not appear that this was entirely successful, however, for he subsequently proposed trephining for the surgical cure of this disease, on which the indignant general is stated to have declared him a traitor who was plotting his death, and to have had him beheaded.

Ch'ăn Kwei in the sixth century A. D. is also said to have successfully removed certain diseased viscera by incision through the abdominal wall.

These stories rest upon no definite foundation. Acupuncture, counter-irritation, and various forms of shampooing seem to have been the only forms of surgical treatment practised in this nation, and operative surgery is now, as it probably always has been, practically unknown among the Chinese.

After the time of Hippocrates there is very little of interest from a surgical point of view recorded in Greece itself. His sons, Thessalus and Draco, and his son-in-law, Polybius, were also physicians, and are supposed to be the authors of some of the books in the Hippocratic collection. Aristotle gave a strong stimulus to the study of anatomy, and is said to have written two books on medicine, which have been lost. Through the influence of his pupils the famous library, museum, and schools of Alexandria were formed, and the headquarters of medical knowledge for the time being passed to Egypt. The Alexandrian School is famous for the advances in the knowledge of human anatomy which were made there as a result of the authority which was, for a short time, granted for the dissection of human bodies. The numerous writings of the anatomists of this school have been lost as distinct works, but probably all their important discoveries and teachings have been preserved for us in the works of Celsus, Galen, and Oribasius. Herophilus (about 300 B. C.) was perhaps the most famous of these anatomists, and many of the names of parts which he gave are in use to-day, such as the choroid, the retina, the dura and pia mater, the calamus scriptorius, the duodenum, and the prostate. Erasistratus, his contemporary and rival,

was also a famous anatomist, but we know even less of his work than we do of that of Herophilus. Galen says that he invented the catheter, but it is probable that this instrument was known both in Egypt and in India long before.

The advances in surgery made by the Alexandrian School prior to the Christian era are practically summed up in the first treatise on surgery written in Latin which has come down to us—namely, that of Celsus, or, more properly, of Aulus Cornelius Celsus. Of the personality of this writer we know nothing positively, but he probably lived at Rome about the beginning of the Christian era, and was not a physician by profession, medicine at that time being almost exclusively practised by Greeks. He is quoted by Pliny as an author as distinguished from a physician, and his work was not referred to by any medical writer for over a thousand years after his death. His book was a sort of encyclopædia of the arts and sciences of his time, intended for educated men, but not specially for physicians, and the medical portion consists of eight books or sections, which, in the original, followed the five books of the treatise on agriculture—the first book of the "De re Medica" being in the oldest Vatican manuscript entitled "Auli Cornelii Celsi liber sextus, idemque medicinæ primus." After the invention of printing the "De re medica" of Celsus was one of the first books that issued from the press, having been published in 1478, since which date there have been over sixty Latin editions and translations into most modern languages.

Most persons not familiar with the history of the art are accustomed to place Celsus with Hippocrates and Galen as one of the three great Fathers of Medicine; but he was really only a compiler, although a compiler whose conciseness and clearness of style have gained for him the title of "the Medical Cicero." As Greek was the professional language of his day, he could find no Latin equivalent for many of the technical terms, and was obliged to use either a descriptive periphrasis or to give the Greek word, introduced by the phrase "the Greeks call it." He was also troubled by the fact that in writing in Latin on the subject of hernia he was compelled to use what was considered to be a very immodest and improper word, for which he duly apologizes; and this is one of the numerous proofs that his work was not intended for physicians especially, but for the educated public.

A compiler without practical experience is sure to make some mistake; and a good illustration of this is found in the remarks of Celsus upon dislocation of the hip, as pointed out by Broca. Dislocation of the hip-joint, prior to the discovery of anæsthetics and the introduction of Reid's method, was often very difficult to reduce; but after it had once been reduced there was no special difficulty in keeping the head of the femur in its proper place. Celsus had probably never seen a case, but he had heard that one of the great dangers is that when reduced it may slip out again, this idea having probably arisen from confounding fracture of the neck of the femur with dislocation of its head; so he argues as follows: "Some maintain that it always does so [*i. e.* slips out again], but Hippocrates, Diocles, Philotinus, Nileus, and Heraclides the Tarentine, very celebrated authors, have asserted that they have effected a perfect cure. Neither would Hippocrates, Andreas, Nileus, Nympho-

dorus, Protarchus, Heraclides, and also a certain mechanician have invented so many kinds of machines for extending the femur in this case if it had been to no purpose. . . . . Therefore it must be attempted." The logic is excellent, but the point which he supposes to be in dispute is wholly imaginary.

Some of the details of surgical practice given by Celsus will be considered in connection with those found in other writers next to be referred to. Of these the chief is Claudius Galen, who was born at Pergamus 131 A. D. He studied medicine at the schools of Smyrna, Corinth, and Alexandria, and returned to Pergamus at the age of twenty-eight, when he was appointed to the medical charge of the athletes of the gymnasium connected with the temple of Æsculapius. Four years later he went to Rome, where he soon became celebrated. He finally returned to his native country, where he died when about seventy years old. He is said to have written five hundred treatises on medicine, but a large number of these have been lost, and a number which exist in manuscript have not been printed.

The medical system of Galen is happily compared by Daremberg to a tissue of which the Hippocratic Writings are the woof and those of Aristotle the warp. His anatomy is mainly contained in his treatise "De usu partium," the purpose of which treatise is to prove that all the organs of the body are arranged in the best possible manner and show the wisdom and care of Nature. After a few preliminary definitions he begins his third section as follows: "As man is the wisest of all animals, so the hands are the instruments which belong to a wise being. For man is not the wisest of animals because he has hands, so says Anaxagoras, but he has hands because he is the wisest, as says Aristotle, who judges very judiciously. In fact, it is not by his hands, but by his reason, that man has learned the arts. The hands are an instrument, as the lyre for the musician or the pincers for the blacksmith."

Between the time of Celsus and that of Galen there were three writers whose names should be mentioned in a sketch of ancient surgery, although their works have for the most part been lost—namely, Soranus of Ephesus, about 79–138 A. D., and Rufus of Ephesus, and Heliodorus, about the beginning of the second century. The treatise of Soranus on the diseases of women, edited and translated into Latin by Ermerius, was published in 1869, and his "De signis fracturarum" was published by Cocchius, with a translation, in 1754. A considerable part of his medical writings form the books ordinarily attributed to Cælius Aurelianus. Such works of Rufus as have been preserved were edited and translated into French by Daremberg, and published in 1879. Heliodorus lived at Rome in the time of Trajan, about the beginning of the second century A. D., and wrote a treatise on surgery, the fragments of which, preserved for us by Oribasius, indicate that he must have been a skilful surgeon, well acquainted with anatomy and with various modes of operating which have been proclaimed as marvellous in later days, such as the torsion of arteries, a particular mode of operating for the radical cure of hernia by excision of the sac, the excision of stricture of the urethra, etc.

After Galen, probably about the end of the third century, came a surgeon named Antyllus, who seems to have been a skilful operator and

an original writer, but of whose works we have only fragments preserved in the writings of Oribasius, a native of Pergamus, who was the physician and friend of the emperor Julian about the middle of the fourth century. Oribasius wrote a huge medical cyclopædia, which formed seventy books, of which over two-thirds have been lost, but what remains is of much interest in an historical point of view, because he copied literally, or nearly so, the text of the authors from whom he compiled, often giving their names, and in this way has preserved fragments of many works of which we have no other means of knowledge.

The next in time of the great medical compilers and encyclopædists is Ætius Amidenus, who lived in the early part of the sixth century, studied medicine in Alexandria, and practised at Constantinople, where he became famous. He wrote a work in four books, each containing four sections, which is known as the "Tetrabiblos." There are no translations into modern languages. It is an important work in the history of surgery, containing extracts from previous authors not found elsewhere, and it supplements, to some extent, what remains to us of Oribasius, as it contains copies of some of the lost sections of that writer. He describes charms and amulets, in which he had full faith, and he has been supposed to have been a Christian, because in extracting a bone he recommends the use of the following word-charm: "Bone, as Jesus Christ caused Lazarus to come out of the grave, as Jonah came out of the whale's belly, come out!"

Following Ætius, about the middle of the sixth century was Alexander of Tralles, a Lydian, who practised at Rome, and wrote a work on medicine in twelve books, the Greek text of which was first published at Paris in 1548. He was a Christian, and made use of amulets and incantations, of which he gives several specimens.

Paul of Ægina (Paulus Ægineta), the last of the Greek writers on medicine, lived in the early part of the seventh century and studied at Alexandria. His seven books are among the most famous of medical classics, and form a compend and abridgment of the medical literature of his day carefully selected and concisely expressed. His main source of information appears to have been the works of Oribasius. He does not pretend to any originality, as will be seen by the following extract from his preface: "It is not because the more ancient writers had omitted anything in the art that I have composed this work, but in order to give a continuous course of instruction; for, on the contrary, everything is handled by them properly and without any omissions, whereas the moderns have not only in the first place neglected the study of them, but have also blamed them for prolixity. . . . . To remember all the rules of the healing art and all the particular substances connected with it is exceedingly difficult, if not altogether impossible. On this account I have compiled this brief collection from the works of the ancients, and have set down little of my own, except a few things which I have seen and tried in the practice of the art." The sixth book is a system of operative surgery, the most complete of any which have come to us from before his time, and the source of most of the surgical treatises of Arabian authors. In it he never refers to Celsus, but often to Galen.

Having thus given a brief account of the principal Greek and Latin writers on surgery whose works are known to us, we may now consider

the progress in the art which had been made between the time of Hippocrates and that of Paul of Ægina, a period of about one thousand years.

First, as to hemorrhage from recent wounds, and more especially arterial hemorrhage. Upon this subject the Hippocratic Writings contain nothing. Celsus says (lib. v. cap. xxvi.): "If we fear the hemorrhage, the wound is to be filled with dry pledgets of lint, and a sponge squeezed out of cold water is to be applied and compressed with the hand. If the blood still issues, the lint must be changed frequently, and if dry lint does not succeed, it should be moistened with vinegar. Caustics should not be used, except in urgent cases, on account of the inflammation which follows their use. If compression, cold, and vinegar fail to stop the bleeding, the vessels which pour out the blood are to be seized and tied with two ligatures, one on each side of the wounded part, after which the vessels are to be divided between the ligatures, that they may retract and still have the openings closed. If the case does not admit of this, the actual cautery may be used." Celsus makes no reference here to any distinction between arterial and venous hemorrhage. In speaking of castration he says: "The veins and arteries must be secured by a ligature at the groin and divided behind it." This is the first mention of the ligature of blood-vessels in published literature: it was an invention of the Alexandrian School, and is said to have been introduced at Rome by Euelpistus, who lived a short time before Celsus.

Galen refers in several places to the use of the ligature, but treats more especially of hemorrhage in the fifth book of the Methodus Medendi. He directs that the finger be placed gently upon the mouth of the bleeding vessel, extending and compressing it. If the wounded vessel lies deep, the surgeon must thus learn its position and size, and then, whether it be a vein or an artery, lift it with a hook and twist it a little. If this does not answer and it is a vein, styptics, such as roasted rosin, fine flour, gypsum, etc., are to be tried; but if it is an artery, it must be either ligated or entirely divided. Sometimes the veins must also be ligated and divided; but it is safer to do both—that is, to ligate the proximal end of the vessel and also to divide it beyond the ligature. Oribasius says nothing about the ligature, but advises the cautery if the bleeding cannot be checked otherwise. Paulus Ægineta copies Galen almost literally, but says, in addition: "You may know whether it is a vein or an artery that pours forth the blood from this, that the blood of an artery is brighter and thinner and is evacuated by pulsations, whereas that of the vein is blacker and without pulsation."

While it is thus evident that the use of the ligature was known from the beginning of the Christian era, it is curious that it seems never to have been employed to check hemorrhage from vessels divided in amputations.

Celsus remarks that in cases of gangrene of an extremity the incision is to be made between the sound and the corrupted part, but says nothing about details. Galen's advice is the same as that of Hippocrates. Paulus says: "Leonides properly directs us not to divide all the parts at once unless they are completely mortified, but first to cut the part where not many nor very large veins or arteries are known to be situated, down to the bone quickly; then to saw the bone as rapidly as possible, applying a linen rag to the parts which have been cut, lest they be torn by the

sawing and cause pain, and then, having cut through what remains, to apply red-hot irons to the vessels, and stop the hemorrhage thereby with compresses of lint." The Leonides referred to here was an Alexandrian surgeon who lived about the beginning of the third century A. D. Prior to this, however, Archigenes, a celebrated physician who lived at Rome about the beginning of the second century A. D., and Heliodorus, had given more details as to methods of amputation, as appears from the fragments of their works preserved in the collection of Nicetas, published by Cocchius in 1756. Archigenes appears to have commenced the operation in some cases by a preliminary ligature of the blood-vessels supplying the parts; the incision was a circular sweep down to the bone. The red-hot iron was used to check hemorrhage. The method of Heliodorus is substantially the same as that of Leonides.

Aneurism is not mentioned by Hippocrates or by Celsus. Galen describes it in his work "De tumoribus," saying that it may arise either from simple dilatation or from a wound of an artery, and is recognized by its pulsation. The only treatment he refers to is compression by means of sponge.

The following is an extract from the treatise of Antyllus on aneurism, as given by Oribasius: "There are two kinds of aneurysm. In the first the artery has undergone a local dilatation; in the second the artery has been ruptured. The aneurysms which are due to dilatation are longer than the others. The aneurysms by rupture are more rounded. To refuse to treat any aneurysm, as the ancient surgeons advised, is unwise; but it is also dangerous to operate upon all of them. We should refuse, therefore, to treat aneurysms which are situated in the axilla, in the groin, and in the neck, by reason of the volume of the vessels and the impossibility and danger of isolating and tying them. We should not touch an aneurysm of large volume even when it is situated in some other part of the body. We operate in the following manner upon those which are situated upon the extremities and the head: If the aneurysm be by dilatation, make a straight incision through the skin in the direction of the length of the vessel, and, drawing open by the aid of hooks the lips of the wound, divide with precautions the membranes which cover the artery. With blunt hooks we isolate the vein from the artery, and lay bare on all sides the dilated part of this last vessel. After having introduced beneath the artery a probe, we raise the tumor and pass along the probe a needle armed with a double thread in such a manner that this thread finds itself placed beneath the artery; cut the threads near the extremity of the needle, so that there will be two threads having four ends; seizing, then, the two ends of one of these threads, we bring it gently toward one of the two extremities of the aneurysm, tying it carefully; in like manner also we bring the other thread toward the opposite extremity, and in this place tie the artery. Thus the whole aneurysm is between the two ligatures. We open then the middle of the tumor by a small incision: in this manner all which it contains will be evacuated, and there will be no danger of hemorrhage.

"To tie, as it has been advised, the artery on both sides the vein, and then to extirpate the dilated part which finds itself between, is a dangerous operation; frequently, in fact, the violence and tension of the arterial pneuma push off the ligatures.

"If the aneurysm owes its origin to the rupture of the artery, we isolate with the fingers as much of the tumor as we can, including the skin, after which we pass underneath the isolated part the needle with the double thread and proceed as before; after which the tumor may be opened at its summit and the superfluous portion of the skin cut away."

Upon injuries of the skull and trephining Celsus speaks at considerable length, quoting fully from Hippocrates. To distinguish a fissure from a suture he advises the pouring of ink on the part and then scraping the bone; if there is a fissure, the ink will mark it. He says that if blood is extravasated beneath the cranium, the overlying bone will be pale. If no dangerous symptoms come on, he would defer operating on the bone for five days. All depressed bone is to be removed, but no more is to be taken away than is necessary. Galen preferred the use of small gouges, and of an instrument called a lenticular, to that of the trephine. He says that all greatly bruised (and depressed) bone is to be removed, but that simple fissures do not require operation. Paulus copies Galen. It will be seen that the Greek and Roman methods did not differ greatly from those of the present day.

In fractures of the spine Paulus says that, "having first given warning of the danger, we must, if possible, attempt to extract by an incision the compressing bone," and that the same is to be done in case of fracture of one of the spinous processes.

Celsus (lib. v. cap. xxviii.) describes carcinoma as usually occurring about the face, and in the breasts of females, but says that it may also occur in the liver or spleen. It is the seat of some lancinating pains, is tumefied, immovable, and unequal, and the veins about it are swollen and tortuous. It commences by what the Greeks call cacoethes, then proceeds to carcinoma or scirrhus without ulceration, then to an ulcer which becomes fungous. "None of these can be removed except the cacoethes; the rest are aggravated by every method of treatment, and the more energetic the remedies the more irritable they become. . . . . None were ever treated successfully with medicine; . . . . after excision, though a cicatrix has been formed, they have returned again and carried off the patient. . . . . But no one can distinguish a cacoethes, which is curable, from a carcinoma, which is incurable, except by time and experiment."

Galen describes cancer at greater length, but adds nothing to the means of diagnosis: the only chance of cure lies in excision, but if this be performed the arteries must not be tied.

Paulus merely abridges Galen's description, says nothing about an operation, and advises external applications. A hard tumor which is wholly insensible is incurable.

Cystic tumors, including atheroma, meliceris, and steatoma, are briefly but clearly described by Celsus (lib. vii. cap. vi.); they are to be removed by incision: in steatoma the cyst must be divided, in the others it may be removed entire. Antyllus gives a more detailed description, which is quoted by Oribasius (lib. xlv.).

The Hippocratic oath requires that lithotomy be left to those who make a special business of it. The first author who describes the operation is Celsus (lib. vii. cap. xxvi.). He says it should only be performed in the spring, and on children between the ages of nine and fourteen, and

in urgent cases when medicines have failed, although he admits that a rash operation now and then succeeds. The operation described is that which is commonly known as "cutting on the gripe," or, in modern times, as the "Celsian operation." The description given by Celsus is detailed, and in most points is very clear (lib. vii. cap. xxvi.). The essential principle is to force the stone down into the neck of the bladder and hold it there by two fingers introduced into the rectum, after which a lunated incision is to be made through the skin of the perineum immediately over and extending to the neck of the bladder, and a second incision in the convex part of the wound, so as to open the neck of the bladder freely; and the wound should be a little larger than the calculus, for those who dread a fistula make too small an opening, and are afterward reduced to the same inconvenience with still greater danger, because the calculus when forced will make a passage unless it find one; and this is even still more injurious if the form and inequalities of surface have contributed in any way to this effect. If the stone is so large that it cannot be extracted without lacerating the neck of the bladder, it must be split according to the method of Ammonius, who was known as Lithotomus, the stone-cutter. It is done in this manner: A crotchet is introduced to the calculus, so as to hold it fast while being struck, lest it should recoil backward; then an iron instrument of moderate thickness is to be employed, the one extremity of which is thin, but blunt, and being applied to the stone and struck at the other extremity, splits it, great care being taken that neither the instrument itself nor any fragment of the stone should injure any part.

There is practically nothing to add to this description by other Greek writers until we come to the time of Paulus, whose description is much the same as that of Celsus. He says that children up to the age of fourteen are the best subjects for the operation: old men are difficult to cure, because ulcers of their body do not readily heal, and intermediate ages have an intermediate chance of recovery. The stone is to be brought down by the fingers in the rectum, as described above; then "we take the instrument called a lithotome, and between the anus and the testicles —not, however, in the middle of the perineum, but on one side, toward the left buttock—we make an oblique incision, cutting down direct upon the stone where it protrudes, so that the external incision may be wider, but the internal not larger than just to allow the stone to fall through it. Sometimes, from the pressure of the finger or fingers at the anus, the stone starts out readily at the same time that the incision is made, without requiring extraction; but if it does not start out of itself, we must extract it with the forceps called the stone-extractor." . . . . "If the stone, being small, fall into the penis and cannot be voided with the urine, we may draw the prepuce strongly forward and bind it at the extremity of the glans. We must next apply another ligature round the penis behind the member, making the constriction at its extremity next the bladder, and then make an incision down upon the stone, and, bending the penis, we eject the stone, and undoing the ligatures we clear away the coagula from the wound. The posterior ligature is applied lest the calculus should retreat backward, and the anterior in order that, when untied after the extraction of the stone, the skin of the prepuce may slide backward and cover the incision."

After the capture of Alexandria by the newly-risen Mohammedan power, about 640 A. D., the Arabians became the inheritors and preservers of the science of the Greeks. The first notions of medicine obtained by the Arabs were probably derived from Persia, if we may judge by the names of a great number of their drugs, and the medical knowledge of Persia came in part from India and in part from Greece.

The first Arab physician of note was Hareto Ben Coladoh, who lived about the middle of the sixth century, and who seems to have studied medicine under the Nestorians, a Christian sect dating from the early part of the fifth century and occupying the ancient countries of Assyria and Persia. The Nestorian physicians appear to have been very zealous in collecting and preserving all the medical works which could be found at that time, including those of the Hippocratic collection and the writers of the Alexandrian School. In the mean time, after the destruction of Jerusalem, certain Jewish physicians and teachers had settled in Alexandria, and after the fall of that city we find some of these Jewish physicians taking somewhat prominent positions and being collectors and translators of the medical literature of the Greeks. The so-called "Arabic books on medicine" were largely compends and summaries of the works of Greek writers which had been translated into Syriac or into Hebrew, and thence into Arabic, or, in some few cases, directly into Arabic. There are very few of these which contain any matter of interest to the history of surgery.

The most famous of their writers was Avicenna (980–1036 A. D.), a native of Persia, who for five hundred years rivalled Galen as an authority, and, like him, was called the Prince of Physicians. The medical works of Avicenna, known as "The Canon," are a sort of encyclopædia, in which the opinions of the Greeks and of Galen are mingled with Oriental philosophy, forming a very prolix and in many places obscure treatise upon all subjects connected with medicine. It was translated into Latin by Gerard of Cremona, and became for a time the principal guide for European physicians, its high repute being probably due in part to the difficulty of understanding it.

The most celebrated writer on surgery of the Arabian School was Albucasis, also known as Bulchasis, Abulcasis, or Alsaharavius, and properly as "Khalaf Ibn 'Abbás (Abu Al-Kásim) Al-Zahráwi." He was born at Zahra, near Cordova, and died about 1105 A. D. His great work, Al Tesrif or Tasrif—*i. e.* the collection or encyclopædia—included thirty books upon all branches of medicine, but of these only a part have ever been published. The three books of his works on surgery, forming a special treatise (book xxx. of Al Tesrif), were published in Arabic and Latin under the editorship of John Channing at Oxford in 1778, and this is the best printed edition which is available, although in some respects it is obscure and unsatisfactory. A translation into French was made by Dr. Leclerc and published in the *Gazette médicale de l'Algérie* in 1858–61, and afterward issued as a reprint (Paris, 1861); and this is the most convenient edition to consult for most purposes.

The work is divided into three books. The first is devoted to the actual cautery and the use of caustics, with elaborate descriptions of the instruments which are figured. In fact, Albucasis is the first author whose works have come down to us who has given figures and good

descriptions of surgical instruments. The second book relates to incisions of all kinds, bloodletting, scarification, treatment of wounds, and the extraction of arrows and missiles, and the third is devoted to the treatment of fractures, luxations, sprains, etc.

The treatise in general is a clear and comparatively concise statement of methods of treatment. A large part of it is evidently derived from Paul of Ægina or from the original authorities from which Paul of Ægina copied, and it is hard to say how much of his work is really original; but it was the highest authority on the subjects of which it treats during the period of the revival of letters in Western Europe, and is a very important work for the student of the history of surgery or of surgical operations. The following are some specimens of his teachings:

In speaking of the operation of arteriotomy upon the temporal arteries he directs that a portion of the vessel be cut out, so that the two ends may separate in order to prevent hemorrhage. If the artery is large, it is necessary to tie it in two places—at two points—with a strong double thread of silk or of the cord used in instruments of music (catgut), in order that it may not alter before cicatrization takes place, which would bring on a hemorrhage. This ligature should be double, and the operator is to take away the intermediate part, either at the time or later.

In speaking of the operation on scrofulous tumors of the neck he says: "The tumor must be removed little by little, great care being taken not to cut the blood-vessels or the nerves. If a vein or an artery is injured, so that the hemorrhage is troublesome or hinders the operation, put into the wound some vitriol in powder or some kind of hæmostatic powder; bandage the wound, and leave it until the inflammation lessens and the wound tends to putrefaction. Then the hemorrhage will cease and you may go on to complete your operation."

He says: "The ancients have spoken of opening the trachea, but I have not known any one in our country who has practised this operation. If the operation has been decided upon, the incision should be made below the third or fourth ring of the trachea transversely between the two rings, so as not to injure the cartilages, but only to divide the membrane between the rings. I have seen a slave who had cut his throat with a knife. On examining the wound a little blood escaped, but I found that neither the jugular vein nor the artery had been injured. The air came out by the wound; I dressed it and he was cured, and only a little hoarseness of voice followed. I feel, therefore, authorized to say that incision of the trachea is without danger."

In speaking of aneurism he says: "As to the tumors which result from the enlargement of the calibre of the artery, a longitudinal incision should be made over the skin. Enlarge the opening with hooks, dissect the artery, free it from the membranes which surround it, and lay it completely bare; then introduce below it a needle with a double thread and make a double ligature of the vessel, as we have recommended for the excision of the temporal artery; then plunge a knife into the part of the vessel included between the two ligatures, and press out all the blood which is contained therein, until the tumor has disappeared, employing after this the treatment which leads to suppuration until

the ligatures fall." It will be seen that this is a copy of the description of the operation of Antyllus.

In speaking of the removal of certain fungoid abdominal tumors resembling mushrooms he directs that a leaden wire be used to strangle the growths, the wire being drawn tighter and tighter from day to day, so as gradually to penetrate the root of the tumor, so that it may fall without difficulty. He says: "Refrain from attempting to excise tumors which are of a livid color, of slight sensibility, and of an irregular aspect, for these tumors are cancerous." Elsewhere he says: "If the cancer is situated in a region from which it can be entirely removed, such as the breast, the thigh, etc., and, above all, if it has had its commencement little developed, one may operate on it; if, on the contrary, it is large and old, it is necessary to refrain. For my part, I have never been able to cure a single one. I have never seen any one who has succeeded."

His description of the operation of the removal of calculus of the bladder is substantially the same as that given by Celsus.

In the case of a vesical calculus in a woman he says that if you are obliged to treat such a case, you must find a woman with some skill in medicine, but there are very few of them. If you cannot find such, it is necessary to take a midwife, or, at all events, a woman who knows a little something about the matter. This woman is to perform the operation under the direction of the surgeon, according to the method which he gives in detail.

While the arts and sciences were more or less prosperous and progressive in the countries under Mohammedan rule, and especially in Spain, throughout the rest of Europe medicine was substantially in the condition in which it exists in barbarous tribes. With the rise of the monkish orders, and especially of the order of St. Benedict, the priests became the practitioners, and all progress or improvement was practically at an end. Relics, exorcisms, and prayers were more and more relied upon; the teachings of Hippocrates and Galen were for the most part forgotten. The great majority of the monks read nothing but simple formularies and receipt-books. The kings and the great nobles, including some of the bishops, resorted to Hebrew physicians, who during the tenth and eleventh centuries were almost the only persons who possessed medical learning or who wrote upon medical subjects. A Jewish physician in those days was a sort of contraband luxury. On account of his religion he could only be possessed by those who had sufficient power to protect him from mobs and monks; but both Catholic and Mohammedan rulers resorted to him when anything like scientific knowledge was required. Rabbi Isaac was the medical adviser of Pope Boniface VIII., and the physician of Saladin was Rabbi Ben-Moosa, better known as Moses Maimonides, who was one of the most celebrated authors of his race and time (1136–1209 A. D.). It should be noted that the preference was for Jewish physicians as being Jews. For instance, Francis I., being sick, wrote to Charles V. for an Israelite who was an imperial physician. Accordingly, the doctor was sent to Paris, but Francis, finding that he had been converted to Christianity, lost all confidence in his skill and advice, and applied to Solyman II., who sent him a true, original, hardened Jew, following whose advice he drank asses' milk and recovered.

Surgery was for the most part abandoned to barbers, bathers, and seventh sons, and fell into disrepute. These barbers and bathers were considered to be of inferior caste, and an artisan would not take an apprentice of a family of barbers, bath-keepers, shepherds, or butchers. The operators were often peripatetic and were subdivided into specialists. For instance, one operated for hernia, another for calculus, a third for cataract, etc., the knowledge being handed down from father to son, as among the Greeks.

There were no European writers upon, or teachers of, surgery until the time of the rise of the universities in Italy in the thirteenth century. The School of Salernum was probably in existence in the ninth century, the ancient legend being that it was founded by four men—a Jew, a Greek, an Arab, and an Italian—each of whom gave lessons in his own language.

About the year 1060 A. D. there came to this school a certain Constantine, generally known as "Constantinus Africanus." Constantine was a native of Carthage, and had studied in Arabia, India, and Egypt, after which he travelled extensively for over thirty years. Returning to Carthage and bringing with him copies of all the works of the Greek and Arab writers which he had been able to obtain in his travels, he fell under the suspicion of knowing more than it was at that time considered proper for any man to know, and it was with some difficulty that he escaped the punishment then in vogue for such criminals. He fled for refuge to Salernum, where he was received with honors, which, however, he put aside, and retired to the neighboring monastery of Monte Casino, where he spent the rest of his life in translating and annotating the medical works which he had collected. These translations became the text-books of the Salernitan doctors, and in the next century the school was resorted to from all parts of Europe by those who had heard of these long-lost and forgotten treasures of learning, which at that time were far in advance of the existing knowledge of the ordinary practitioners.[1]

The doctrines of the school became more and more Arabic, and it had lost its importance in the fourteenth century, having been superseded by the schools of Naples, Bologna, Paris, and Montpellier.

At the beginning of the thirteenth century comes the first writer on surgery in the West—namely, Roger of Parma, whose work was first printed at Venice in 1490, and is included in several editions of the works of Guy de Chauliac. The Surgery of Roger is substantially the sixth book of Paul of Ægina. Following him came his pupil and commentator, Roland, who was also of Parma. His work is a copy of that of Roger, with notes and some references to Hippocrates, Galen, and Avicenna which do not appear in the work of his master.

The story of the Four Masters, as told by Quesnay, is a romantic one—*i. e.* that they devoted their lives to the care of the sick poor in Paris, their residence being a sort of surgical dispensary; that they made many discoveries and improvements which they described in a book which was known to Guy de Chauliac, but has been lost; etc. Several

[1] For a full and interesting discussion of the writings of Constantine and the authors copied and abridged by him, consult "Constantinus Africanus und seine Arabischen Quellen," von M. Steinschneider, *Archiv f. path. Anat.* (Virchow), 1866, vol. xxxvii. p. 361.

manuscript copies of this work are now known to exist, and in 1859 one of these was edited by Daremberg and published.

The history of surgery in Europe thus begins in Italy at Salernum, and in Bologna, where Hugo of Lucca flourished during the first half of the thirteenth century, and was followed by William of Salicet. We have no writings from Hugo, but the *Cyrurgia* of William remains to us. The first edition of the original Latin was published at Placentia in 1476, and this, with other editions, including French translations (Lyons, 1492, and Paris, 1507) and an Italian translation published at Milan in 1504, is in the Army Medical Library at Washington.

William of Salicet was the most celebrated surgeon of his century; he was an educated physician, who gives some of his own observations and his own conclusions, hardly citing previous authors, although it is evident that he was familiar with the works of Avicenna and of Galen. It is a pity that the *Cyrurgia* has never been translated into English.

The next noted surgeon of this period is Lanfranc of Milan, a pupil of William of Salicet, to whom he refers as his "master of goodly memory." Lanfranc also received a university education, and was a physician as well as a surgeon. Political troubles having caused his banishment from Milan, he went first to Lyons, where he wrote an epitome of surgery, and finally in 1295 to Paris, where he gave, at the School of Medicine, a course of lectures which were probably embodied in his great Surgery, which he completed in 1296. He was thus the introducer of the new Italian ideas into France. His large work was first published at Venice in 1490 under the title *Practica quæ discitur ars completa totius Chirurgiæ.*" In the same year a French translation by Guillaume Yvoire was published at Lyons, and of this there is a copy in the Bibliothèque Nationale at Paris.

After Lanfranc came Henri de Mondeville, a native of Normandy, of whose early life nothing is known except that he studied at Montpellier, and at Paris under Jean Pitard, who will be referred to hereafter, and that he was one of the four surgeons of the court of Philip the Fair prior to 1301. In 1306, at the request, as he says, of Bernard de Gordon, a distinguished professor of Montpellier, he began to write, and to read to his numerous pupils, a systematic treatise on surgery, which he did not complete, although he lived until about 1318. This treatise, of which several manuscripts exist, was finally edited and printed by Dr. Julius Leopold Pagel of Berlin in 1892, forming an octavo volume of 660 pages having the title of *Die Chirurgie des Heinrich von Mondeville (Hermondaville), etc.*, and has been translated into French and published in 1893 by Professor Nicaise of the Faculty of Medicine of Paris. His practice is much the same as that of Lanfranc, and of his successor, Guy de Chauliac, who often quotes him. He describes the method of ligating a wounded artery, recommending a peculiar kind of slipknot, but says nothing of ligating the vessel in amputations, and refers to the use of the anæsthetic sponge described by Guy.

Here may also be mentioned the Surgery of Master Jean Yperman, a native of Flanders, who was born in the latter part of the thirteenth century and studied under Lanfranc in Paris. The manuscript of his book, dated 1351, was first described, and in part published, by Dr. Carolus in the *Annales de la Société de Médecine de Gand* (vol. xxxii. 1854); also published separately as a reprint. He refers to Roger and Roland and the Four Masters, and frequently to Lanfranc, beyond whose teachings he seldom ventures to go, although he does give some cases of his own.

The great French surgical author of the fourteenth century was Gui (or, as it is more usually given, Guy) de Chauliac, "Guido de Chauliaco," born about 1300 A. D. He received the university training of the clerical profession and studied medicine at Paris, after which he continued this study at Montpellier and Bologna, so that he had the benefit of the three greatest universities of that time—Paris being especially celebrated for its surgery after Lanfranc had reached it; Montpellier being the centre for medicine; and Bologna for anatomy, of which Bertrucius was then professor. After extensive travels, and practice in different places, including Lyons and Montpellier, he went to Avignon and became the physician of Pope Clement VI. and of his successors, Innocent VI. and Urban V. His chief literary work was his *Chirurgia*, written at Avignon in 1363, and first published at Lyons by Nicholas Panis in 1478.

The "Great Surgery" begins with a special introductory chapter, the *chapitre singulier*. He says: "Up to the time of Avicenna all writers were both physicians and surgeons (*i. e.* well-educated men), but since that time, either because of the fastidiousness or the excessive occupation of the clerics, surgery has become a separate branch and has fallen into the hands of the mechanics.

"The sects which have existed in my time among the operators of this art, besides the two general ones of the Logicians and the Empirics, have been five.

"The first was the school of Roger, Roland, and the Four Masters, who treat all wounds and abscesses alike with cataplasms and poultices, on the ground of the fifth aphorism, 'Lax things are good, and crude bad.'

"The second was the school of Bruno and Theodoric, which treated all wounds alike with wine, basing their practice exclusively upon the maxim, 'The dry is nearest to that which is sound, and the moist to that which is not sound.'

"The third sect was that of William of Salicet and of Lanfranc, who wished to pursue the middle course, covering and dressing all wounds with ointments and soft plasters, founding this practice on the fourteenth maxim of the Therapeutics—that curation has one sole method; that the treatment should be gentle and without pain.

"The fourth sect is composed of all the military men, or German chevaliers and others following the army, who, with conjurations and potions, oil, wool, and cabbage-leaves, dress all wounds, basing their practice on the maxim that God has given his virtue to herbs and to stones.

"The fifth sect is of women and of many fools, who refer the sick of all diseases to the saints solely, saying, 'Le Seigneur me l'a donnee ainsi qu'il luy a plû; le Seigneur me l'ostera quand il luy plaira; le nom du Seigneur soit benit. Amen.'"

It will be seen that Guy is quite trenchant in his summaries and criticisms, which, however, appear to be on the whole fair and justifiable.

The teachings of Guy were the chief authority in surgical matters

for over two hundred years, and were the basis of numerous abstracts, compends, and commentaries. He contributed little that was original, although he gives some of his own observations. Follin remarks that a sort of canulated sound, the dressing of ulcers with sheet lead, and some peculiarly-shaped cauteries are his chief inventions; but his book is one of the monuments of surgical literature.

The *Sermo septimus de cyrurgia et de decoratione* of Nicholas Falcutius, of which the Washington Library has an edition printed at Florence in 1507, is a huge folio volume compiled from the works of Arab writers, with references to Roger and Roland, but not to Guy de Chauliac, so far as I have found. His formula of words is "Dixit Haly," or "Avicen," or "Albucasis," without attempt at comment.

In the days of Lanfranc and Guy de Chauliac surgery in Western Europe was distinct from medicine, and was looked upon as a trade or handicraft degrading to and unworthy of physicians, who claimed to belong to the nobility. The physicians were of the priestly class and abhorred the shedding of blood, and their traditions were adhered to long after medical teaching in the universities had passed into the hands of laymen. The barbers were the ordinary surgical operators, and the reason for this is given by Dr. Gardner[1] as follows: "The monks, as all the world knows, required to have their heads regularly shaved, but it is not by any means so well known that they had to be bled at stated periods. *Minutus est* was the form of words descriptive of one who had undergone the operation, the meaning being that he had been *minutus sanguine*—*i. e.* deprived of blood. In the monastery of St. Victor at Paris there was an order which prescribed such minution five times a year: 'Prima, est Septembri; secunda, ante Adventum; tertia, ante Quadrigesimum; quarta, post Pascha; quinta, post Pentacosta.' The monks, therefore, required to have about them those who could both shave and bleed, and it was very natural that they should prefer that one and the same person should perform both these operations."

In France, however, at an early date there were a few persons whose business was the performance of surgical operations, and who were not ordinary barbers, although they may have served an apprenticeship as such. The Corporation of Barbers in the middle of the thirteenth century was divided into two classes—the ordinary or lay barbers, afterward known as "barber surgeons" or "surgeons of the short robe," and the "clerk barbers" or "surgeon barbers," "the surgeons of St. Côme," or "surgeons of the long robe;" and these last sought to be independent of the ordinary barbers, to monopolize surgical operations, and to raise their association from the position of a trade guild to that of a professional organization. The Guild of the Surgeon Barbers was organized in 1268 by an order of the provost of Paris, selecting six surgeons who were to examine and license those who wished to practise, more especially the barbers. Possibly one of these masters was the celebrated Jean Pitard, but if so he must have been very young, for he was still living in 1326. In 1311, Pitard obtained a decree from King Philip the Fair, in which, after reciting that all sorts of quacks are infesting the city, it is ordered that "no male or female shall practise surgery in Paris who has not been

[1] Gardner (John): *Sketch of the Early History of the Medical Profession in Edinburgh*, Edinb., 1864, p. 6.

examined by our sworn surgeons of Paris named and called together for that purpose by Jean Pitard, our sworn surgeon of the Châtelet, or his successors."

It was evidently impossible to enforce this order, for it was repeated in 1352, and again in 1364, with penalties of fines on the erring barbers, half of the fines to go to the surgeons' guild, the Brotherhood of St. Côme. The organization of this brotherhood was by no means pleasing to the medical faculty, the members of which desired to retain control of all branches of the art, and discredited surgery as a mere mechanical handicraft only to be exercised under the direction of a physician, whose dignity forbade him to soil his hands. The statutes of the faculty in 1350 require the candidates to make oath that they will not practise surgery in the sense of performing operations or making applications by the hands, including the treatment of five classes of affections—viz. wounds, ulcers, fractures, dislocations, and tumors.

The lay barbers were employed by the physicians, and also sometimes as assistants by the surgeons, and at last, in 1372, the barber of the king, being the master of the guild of barbers by virtue of his position, induced Charles V. to issue an edict which permitted them to treat wounds and sores and forbade the surgeons to interfere with them. The relative standing in the eyes of the public of the three kinds of practitioners—viz. the physicians, the surgeons, and the barbers—may be inferred from an order issued during an epidemic of the pest in 1383, which directed that there shall be selected to visit the sick four physicians, two surgeons, and six barbers, and the fees of the doctors shall be three hundred livres, of the surgeons one hundred and twenty livres, and of the barbers eighty livres.

The so-called College of Surgeons of Paris was not in the least a surgical school or an association for mutual discussion and improvement: it was purely a trade guild, and the students were simply apprentices to the master surgeons, becoming, after 1370, bachelors, licentiates, and finally masters. The surgeons had a free dispensary, where they treated the poor once a week, and perhaps the apprentices saw there something of the practice of other masters besides their own.

The medical faculty, thinking that its rights, privileges, and monopoly of treating the sick were being encroached upon by the surgeons, encouraged the barbers in their controversies, and as one means of doing this undertook to teach them anatomy. As the barbers did not understand Latin, which was the only dignified and proper language to be used in teaching in those days, a compromise was necessary, and this was effected partly by the use of a sort of dog-Latin, of French words with Latin terminations, and partly by reading Guy de Chauliac in Latin, but with comments in French, while the assistant barber made the incisions in the cadaver and pointed out the parts as the reader named them. In 1505 the barbers came more formally under the protection and jurisdiction of the faculty, and assumed the name of the Guild of the Barber Surgeons, and a few years later the surgeons of the long robe, having opposed this movement with very little success, and having failed to become a separate faculty in the university, submitted to also receive instructions from the physicians. Almost all the medical officers attached to the French armies came from the Corporation of Barber

Surgeons, and finally one of them, Ambrose Paré, acquired so much reputation and influence as to considerably increase the respectability and standing of the guild. As a sample of surgical associations in the provinces we may take the surgeons of Bordeaux, who in 1519 formed a society composed of *béjaunes* (yellow beaks or young birds—*i. e.* aspirants) and companions. They had a password and special secrets; instruction was given in the winter at 5 A. M. in the form of commentaries on Guy de Chauliac, and in the course of one hundred and sixty-nine years five bodies were dissected.[1]

There is little of importance in the history of surgery during the next hundred years after the death of Guy de Chauliac. Peter of Argelata, lecturer on surgery at Bologna about the beginning of the fifteenth century and dying in 1423, was the principal surgeon of his time. His six books on surgery, edited by Moretus, first published at Venice in 1480, are largely derived from Paulus and Guy. He was an operator as well as a theoretical teacher, performed lithotomy and herniotomy, embalmed Pope Alexander VI., practised craniotomy of the fœtus in difficult labors, etc. A copy of his books was annotated on the margins by Marcellus Cumanus, a surgeon in the Venetian army in 1495, and these observations were finally published by Velschius (G. H.) in his *Sylloge Curationum* (Aug. Vindel., 1668). Cumanus found nothing in Argelata about the treatment of gunshot wounds, and he noted a formula for this purpose consisting of a mixture of oil of roses, galbanum, and asafœtida, to be applied hot.

Gunpowder was used in warfare at least as early as 1338; the English employed it at the battle of Crecy in 1346, but it was a long time before any surgeon published an account of gunshot injuries and their treatment. The first Italian surgeon to do this was John de Vigo (1460–152–), surgeon of Pope Julius II. in 1503, whose *Practica in Arte Chirurgica Copiosa* was first published at Rome in 1514. This book had twenty-one editions in thirty years, and was translated into Italian, French, English, Spanish, Dutch, German, and Portuguese. The great success of the book was due partly to the fact that it was the first complete system of surgery issued after that of Guy de Chauliac, partly to the fact that it contained an account of gunshot wounds and a section on the new disease, syphilis, and also, probably, to a considerable degree, because it was a book which specially suited a practitioner who knew nothing of anatomy and feared or disliked to make use of the knife. It is essentially a surgery of plasters, ointments, and embrocations, and the name of the author is best known to-day in connection with the "emplastrum de Vigo."

The part relating to gunshot wounds is brief. He says they are contused and burned, and therefore need moist applications, but that they are also poisoned by the powder, and therefore need desiccation; hence they are hard to cure. They are to be cauterized with the actual cautery or with boiling oil of elder, "for cauterization kepeth the wounde from putrefyinge."

His chapter on syphilis begins as follows (I use the English translation of 1543): "In the yeare of our Lord 1494, in the moneth of December, when Charles the Frenche kynge toke hys jorney into the

[1] Sous (G.): *Bordeaux médicale*, 1877, p. 49.

partes of Ytaly to recover the kyngdome of Naples, there appeared a certaine dysease throughout al Ytaly of unknowen nature, which sondre nations hath called by sondry names. The French men call it the dysease of Naples, because the souldyours brought it from thence into France. The Neapolitanes call it the Frenche dysease."

Controversies as to whether syphilis existed prior to the fifteenth century have been many, and the literature on the subject is voluminous; but no positive and convincing proofs of such existence have yet been found, although it is probable that it did occur before that time. One of the theories of its origin, advanced first by Leonard Schmaus in the preface to his little pamphlet, *Lucubratiuncula de morbo gallico et cura ejus noviter reperta cum ligno indico* (sm. 4°, Aug. Vindel., 1518), is that it was brought from the West Indies by the sailors who returned with Columbus after his first voyage, and attempts have been made to furnish positive evidence of this from human bones showing evidence of disease, and antedating the Columbian discovery; but none of these have been convincing to skilled pathologists. Schmaus says in his preface that he learned of its American origin from merchants and sea-captains; but it is probable that this idea was first suggested by the use of guaiacum in this disease. Guaiacum came from America, and it was a common idea that the bane and the antidote belonged together and were to be found in the same vicinity. It is certain that the disease existed in America soon after the second voyage of Columbus.

After John de Vigo came Alexander Benedictus (145?–1525), who was professor of anatomy at Padua, an army surgeon, and who operated for hernia and calculus. He is the author of treatises on anatomy and on the pest, and of *De omnium a vertice ad plantam morborum signis, etc.* (Venice, 1535; Basil, 1594), which contains his surgical recommendations.

Jacobus Berengarius Carpensis (147?–1550), professor in Bologna, was the author of a celebrated treatise, *Tractatus de fractura calvariae seu cranei* (Bologna, 1518, quarto), of which a number of editions were published. This also contains a few remarks on the treatment of gunshot wounds, which he supposed to be burned or more or less poisoned. He acquired a great fortune at Rome by his treatment of syphilis with mercurial inunctions, of which he is reported to have been the inventor.

Alfonso Ferrius (1500–?) of Naples, the physician of Pope Paul III., wrote *De Sclopetorum sive Archibusorum Vulneribus, libri tres* (Rome, 1552, quarto), in which he maintains that gunshot wounds are poisoned and must be treated accordingly.

Bartholomæus Maggius (1516–62) of Bologna wrote *De Vulnerum Sclopetorum et bombardorum globulis illatorum, etc.* (Bologna, 1552, quarto), of which there were numerous later editions.

Leonardo Botallo (1530–?) wrote *De Curandis Vulneribus Sclopetorum* (Lyons, 1580, octavo), in which he opposed the views of De Vigo and Ferrius as to the poisoned condition of gunshot wounds.

Joh. F. Rota, who lived in the middle of the sixteenth century, wrote *De bellicorum tormentorum vulnerum natura et curatione liber* (Bologna, 1555, quarto).

One of the wisest of the Italian surgeons of this period appears to have been Michael Angelo Blondus (Biondi) (1497–15?) whose little

treatise *De partibus ictu sectis*, first published in 1542, and which is contained in the Gesner Collection and also in Uffenbach's Thesaurus, strongly urges the use of simple water and wetted lint in the dressing of wounds. Nevertheless, he was a partisan of the ancients, and two of his sayings have become historical as illustrating the university spirit of the age—viz. "It is more honorable to err with Galen and Avicenna than to acquire glory with others;" and, "It is better to die by a regular physician than to live by a quack."

One of the most celebrated Italian surgeons of the sixteenth century was Gaspar Tagliacozzi, better known as Tagliacotius (1546–99), who was professor of anatomy and surgery in the University of Bologna, and wrote the first special treatise on plastic surgery, and more particularly on the operation of rhinoplasty, with which his name is especially associated. The title of his book is *De Curtorum Chirurgia per insitionem, libri duo*, of which two editions were published at Venice in 1597. One of these, a large folio published by Gaspar Bindonus, is celebrated for the beauty of its plates, the quality of the paper, and its typography, being a splendid specimen of book-making; the other edition of the same date and place, published by Robert Meiettus, is also a folio, but a much poorer specimen of the printer's and engraver's art. There is also a small octavo edition of Frankfort (1598), and one was published in Berlin so late as 1831. He does not name the person from whom he had learned his method, but it was probably from some one of the Incisors of his day who had acquired his knowledge from a pupil of one of the Sicilian Brancas, who were celebrated for operations of this kind in the middle of the fifteenth century. The elder Branca took his flaps for a new nose from the skin of the face, being the Indian method; his son made use of the skin of the arm, and extended the method to repair of mutilated lips and ears, as we are informed by Bartholomeo Fazia.

The first notice of Tagliacozzi's method is given by H. Mercurialis in his *De decoratione liber* (4°, Venet., 1585, fol. 23). Two of his pupils describe the methods and the results obtained, and acquired repute by their performance of the operation—viz. Thomas Fienus of Antwerp, and Jo. Bapt. Cortesius, who succeeded Tagliacozzi as professor at Bologna; but the practice fell into disuse among surgeons, and little was heard of it until the beginning of the nineteenth century. A curious use of plastic surgery is mentioned by Fortunatus Licetus—viz. the making of double monsters for show purposes by grafting two boys together by the back, nates, or arms, upon which he says: "Averruncet Deus e severe puniant principes tales sicophantes." Victor Hugo refers to the work of these "monster-makers" in his *L'Homme qui rit.*

Marianus Sanctus Barolitanus (1490–154?), a native of Naples and a special pupil of John de Vigo, wrote a treatise entitled *Compendium in Chyrurgia Utilissimum Volentibus ipsas exercere*, which was first published at Rome in 1516, and subsequently appeared in connection with the works of De Vigo. It is also in the Gesner Collection of 1555. Neither Haller nor Malgaigne knew the date of the first edition, which is probably rare. The copy in the Washington Library is a small quarto of fifty leaves, unnumbered and unpaged, and is a fine specimen of black-letter printing. It contains three small rude figures of cauterizing irons, and the last nine pages are occupied with his *Tractatus de Capite.* Marianus Sanctus is best known by his treatise *De Lapide ex vesica per incisionem extrahenda*, in which was, for the first time, published the method of John de Romanes for lithotomy with a grooved staff, upon which an incision was made into the membranous portion of the urethra, after which instruments were introduced to dilate or rupture the prostatic portion. This is known as "the method with the great apparatus," from the number of instruments required, and also as the "Marian operation," from the name of the person who first published the description. The first edition of this treatise appeared at Venice in 1535. It is contained in the Gesner Collection of 1555 and in Uffenbach's Thesaurus of 1610.

The "Gesner Collection," also known as the "Geneva Collection," is a beautifully printed folio with the title *Chirurgia. De chirurgia scriptores optimi quique veteres et recentiores, etc.* (Tiguri, 1555). It was edited by Conrad Gesner, and contains the principal surgical works of Tagaultius, Hollerius, Marianus Sanctus, Bologninus, Blondus, Maggius, Ferrius, Langius, and others, forming a valuable book of reference.

The first collections of the works of different writers on surgery were published at Venice, the first being a small volume issued in 1490, and again in 1497, containing the *Chirurgia parva* of Guy, the Surgery of Albucasis, and the commentary of Bertapaglia on Avicenna. A much more complete collection is the Venice folio of 1498, which contains the works of Guy de Chauliac, Brunus, Theodoricus, Lanfranc, Roger, and Bertapaglia. Of this the Venice editions of 1499 and 1519 are in the Washington Library; also the edition of 1546, which is the best and contains also the treatises of Roland and of William of Salicet.

From very early times there were to be found throughout Western Europe—in France, in Italy, in Germany, and in England—a certain number of surgical practitioners known to the writers of that time as "The Cutters" or "Incisors." Those who operated for lithotomy, hernia, etc. were of the first class. They travelled about from place to place, and maintained more or less secrecy as to their methods, which were held as a special family property, being handed down from father to son. Among these may be mentioned the two Brancas, to whom reference has been made in speaking of Tagliacozzi.

Another group of these travelling operators was known under the name of Norsini. These devoted themselves principally to operations for hernia and to lithotomy. Fabrice d'Aquapendente mentions Horace of Norsia as a skilled operator in hernia. Sylvaticus in 1601 complains that the operation of lithotomy was abandoned to ignorant persons, like the Norsini. In 1633, Cortesi writes that at Messina he had seen Ulysses of Norsia treat hernia by the application of caustic, followed by incision of the eschar; and still later, in 1672, Bernardino Genga says that the Norsini had some experience in the treatment of diseases of the urinary organs.

To this class of Cutters belongs probably the unknown surgeon mentioned by Senarega, who in his history of Genoa says that there died there in 1510 a surgeon very skilled in removing calculi. He introduced into the penis an iron rod, which entered the body until it met the stone which he was seeking, and which he then removed by a perineal incision. It is supposed by some that this unknown Genoese taught his method to John de Romanes of Cremona, who is ordinarily credited

with the invention of the grooved staff for lithotomy, and who taught his method to his assistant, Marianus Sanctus.

The most famous of the Incisors was Pierre Franco, a native of Provence, born about 1500, who operated in Provence, Burgundy, and Switzerland, finally settling in Lausanne for a considerable period, and in 1561 living at Orenge. His *Petit traité contenant une des parties principalles de chirurgie laquelle les chirurgiens hernières exercent* was published at Lyons in 1556. In this he describes and figures the "Algalie" sound for detecting stone in the bladder; says that the calculus is sometimes encysted so that it cannot be felt by the sound; describes the old operation of "cutting on the gripe," which he says he formerly used; the operation with a grooved sound and gorget, of both of which he gives figures, as also of forceps for crushing the stone if it is large; and concludes that if the stone does not present itself when the incision is made, it is best to wait a day or two before attempting to remove it. He describes a case in a child ten years old in which, being unable to extract the stone through the perineal incision, he performed the suprapubic operation, removed the stone, which was the size of an egg, and the patient recovered. This is the first recorded case of the high operation for stone. He says, however, that he does not advise this in ordinary cases. In his description of amputation he does not mention the ligature, but advises the actual cautery, and gives figures of the sickle-shaped knife, the saw, and the cautery-iron. In 1561 he published at Lyons his *Traité des hernies contenant une ample déclaration de toutes leurs espèces & autres excellentes parties de la chirurgie, assavoir de la pierre, des cataractes des yeux, & autres maladies, desquelles comme la cure est perilleuse, aussi est elle de peu d'hommes bien exercée.* This is a small octavo of 16 preliminary leaves, 554 pages, and 1 leaf of errata. It contains all the matter of the preceding book, and much more, with figures of new instruments, and is really a small manual of surgery. The part relating to lithotomy remains substantially the same. Next to the works of Paré, this is the most valuable contribution of the century to surgical literature.

The history of the Colot family is curious and interesting, but is wrongly given by most of the biographers: the best is that given by Dr. E. Turner in the *Gaz. Hebd. de Méd. et de Chir.* (Paris, 1880, xvii. 2e ser. pp. 33, 49).

The story that a certain Germain Colot, a French surgeon, learned the details of the methods of some of the Incisors about 1460, and then, returning to Paris, operated on an archer who had been condemned to be hung, but whose sentence was changed by the king to be operated on by Colot, is probably without foundation. The original account, given in the *Chronique scandaleuse*, does not mention the name of the operator, and Malgaigne says that there is not even a presumption that there ever was a surgeon named Germain Colot.

There was, however, a Laurent Colot or Collot, who lived at Tresnel, near Troyes, in the middle of the sixteenth century, and who learned the method of John de Romanes—or what is called the Marian operation—from an itinerant lithotomist named Octavien da Villa. He kept the method a secret and had great success, being called to Paris in 1556, and was appointed lithotomist of the Hôtel Dieu. The secret and the

office remained in the family, the grandson Philippe (1593–1656) being called to all parts of Europe to operate. His son François (1630–1706) wrote an account of the method, which was published after his death under the title *Traité de l'opération de la taille, etc.* (Paris, 1727). In it he refers to the above-mentioned story about Germain Colot, but does not give his name, and asserts that the operation performed on the archer was a nephrotomy and not a lithotomy. That the so-called family secret could have been preserved until the beginning of the eighteenth century, after the publication of the method by Marianus Sanctus in 1535 and by Franco in 1556, illustrates the education of the surgeons of those days.

We now come to an epoch-making surgeon, Ambrose Paré (1517–90), who was apprenticed to a provincial barber when he was about nine years old. In 1532 he came to Paris, where he was probably again apprenticed to a barber surgeon and attended the lectures of the doctor of the Faculty of Medicine of Paris, whose business it was to explain to the young barber surgeons those parts of the surgery of Guy de Chauliac which relate to tumors, wounds, and ulcers. Very soon after his arrival at Paris he had the good fortune to obtain a position as resident apprentice and dresser in the great hospital of the Hôtel Dieu. Here he had opportunities for dissections, for making post-mortem examinations, and for the study of disease, of which he was not slow to avail himself. In his preface to the reader he says: "You must know that for the space of three years I have lived in the Hôtel Dieu of Paris, where I had the means of seeing and knowing (in consequence of the great variety of diseases brought there) all which can be of alteration and disease in the human body, and to learn from an infinite number of dead all that can be said of anatomy."

At the end of this service, when he was but nineteen years old, he became body-surgeon to Mareschal Monte Jan, and went with him in the army which Francis I. opposed to that of Charles V. in the invasion of Provence in 1536. Gunshot wounds were supposed to be poisoned, and the recognized means of destroying the venom was that prescribed by John de Vigo—namely, cauterization by boiling oil. But in one battle the supply of oil was insufficient, and our conscientious youth could not sleep that night for thinking of the horrible fate that was in store for the poor fellows who had not been cauterized. Great was his astonishment and delight the next day on finding that those who had not been burnt were much more comfortable than those who had been treated *secundum artem*, and that recovery was prompter and more certain in their case. But, while Paré had the sense and the independence to refuse to give unnecessary pain, although commanded to do so by the highest surgical authority of his day, he could not free himself from the notion that some special treatment was required for gunshot wounds, nor accept the plain teaching of his own experience. He decided that the best thing to be done was to use a secret remedy which was the stock in trade of a certain surgeon in Turin, and to learn the composition of this remedy he assiduously courted the good graces of this surgeon for over two years and a half, and finally obtained the secret for a round price, promising not to divulge it. It was an oil of puppies, not much different from lard—a simple protecting soothing application. No sooner had Paré learned the secret than he hastened to publish it, deliberately breaking his promise

on the ground that such an important matter should not be one man's privilege.

The great improvement made by Paré in surgery was the use of the ligature to close bleeding arteries after amputation in place of searing them with red-hot irons, as had been done down to his time.

In the edition of his works published in 1564, *Dix livres de Chirurgie*, he first describes and recommends the application of a ligature to bleeding vessels in amputations, and abandons the use of the cautery. His account is as follows: After alluding to the passage in Galen which states that "the vessels must be tied toward their roots, which are the liver and the heart, to staunch the great flow of blood," he says: "But having many times used this means of closing the veins and arteries in recent wounds where there was a hemorrhage, I thought it might also be done in amputating a member. Therefore, having conferred with Estienne de la Rivière and François Rasse, both surgeons at Paris" [in later editions the name of Rasse is struck out and in place is read "other sworn surgeons of Paris"], "we agreed that we would make the trial upon the first patient which offered, although we would have the cauteries all ready to use if the ligature failed." A few days afterward the ligature was applied with success in a case of amputation of the leg.

Paré was a good anatomist, by far the greatest surgeon of his time, the confidential friend of four successive kings, and is said to have been the only Protestant in Paris who was spared the massacre of St. Bartholomew, which was due to the direct action of the king. Malgaigne's argument against the truth of this story cannot outweigh the direct statements of Sully and of Brantôme.

Catherine de Medici one day asked Paré whether he hoped to be saved in the next world. "Yes, certes, madame," said he, "because I do what I can to be a brave man in this world, and because the merciful God understands all languages, and is as well satisfied with a French prayer as with a Latin one."

To properly appreciate the writings of Paré, they should be compared with those of other teachers of, or writers on, surgery of his day. His treatise upon gunshot wounds may be compared with several small treatises on surgery published in the latter half of the century, thirty or forty years after the appearance of his treatise on this subject, and written in French for the benefit of the barber surgeons. Take, for example, the *Traitté des arcbusades* of Joubert, published at Lyons in 1574. Laurens Joubert (1529–83) was a distinguished physician of Montpellier, professor of medicine in the university and dean of the faculty. He had served in the royal army in the campaign of 1569, where he ought to have heard something of Paré's methods of treatment, but he makes no allusion to them, unless it be where he speaks of the oil of puppies as an anodyne. His *Surgery* is that of John de Vigo, written in a diffuse, pedantic style, which was probably impressive to the barbers in proportion to their inability to understand the meaning of his words. At one time he was called in as an umpire in an argument between a physician (Veyras) and the surgeon of the king of Navarre (Guilhemet) as to whether gunshot wounds are contused and should be treated by poultices, etc. or by desiccatives, as by washing with wine. The arguments on both sides and Joubert's decision were published in a curious little book

entitled *Tracité de Chirurgie, contenant vraye méthode de guérir playes d'arquebusade, etc.*, par M. Jacques Veyras, docteur en Médecine, & M. Tannequin Guilhemet, Chirurgien du Roy de Navarre (Lyon, 1581, 8°). Joubert's decision was, upon the whole, in favor of the views of the physician, as was to be expected. He refers to Paré as "homme digne foy," not with reference to his treatment of wounds, but to his statement that bones may be fractured by the wind of a cannon-ball—this being precisely one of the points on which Paré was wrong.

The first teaching in French given to the barbers and surgeons was by a physician, Jean Canape of Lyons, physician of Francis I., who in the first half of the century gave public lectures to them, and for the same purpose translated into French a compend by Guy de Chauliac (Lyons, 1538, 12°; also 1563–71), some anatomical treatises of Galen (Lyons, 1541), and several other small treatises.

Pierre Tolet (1502–8?), a surgeon of Lyons, in 1540 published a translation into French of the sixth Book of Paulus Ægineta. In his prefatory letter to this, addressed to the French surgeons, he refers to Jean Canape as a man to whom surgery owes more than to any man who has written since Galen.

In 1570, Jacques Dalechamps, physician and reader in surgery at Lyons, published *Chirurgie Françoise* as a manual for the barber surgeons. It consists of the sixth book of Paul of Ægina, Hippocrates on fractures and dislocations, and extracts from Celsus, Albucasis, etc., with the annotations of Dalechamps, and a brief treatise on operations by Jean Girault, master surgeon in Paris.

In 1583, Esaie le Lievre, surgeon, published a little book entitled *Officinne et Jardin de Chirurgie militaire contenant les instrumentz et plantes tres necessaires a tous Chirurgiens, etc.* The general style of this work may be seen in the following sentence: "Nous disons l'harquebuzade ou playe faicte par harquebuze ou canom; estre une affection extreme contusion, combustion, diruption, dilaceratio, concution, fraction, fracation, puis repercution, abolitions, destructions, extinctions, ou mortifications, selon plus ou moings, des espritz tant vitaux, animaux, que naturels: de laquelle complication assemblee, selon la nature & noblesse des parties offensées, se forme une indisposition tendant a rendre ladite partie, consequement tout le subiect en cadaver."

The *Sclopetarius* of Quercetanus (Du Chesne) (Lyon, 1576) is a worthless book by a notorious charlatan. It was translated into English and published at London in 1590 by a certain John Hester, who offered for sale the Arcana prescribed therein. Care is taken to give two sets of remedies—one for the injuries of the common soldiers, the other "to be used for the rich." For advertising purposes the same John Hester published *A Short Discours of the excellent Doctour and Knight, maister Leonardo Phioravanti, Bolognese, uppon Chirurgerie* (London, 1580), advertising at the end that he is prepared to furnish various salves, philosophical oils, and other preparations recommended in it. Phioravanti explains that "the reason why white of egg is to be used in mixing applications for wounds is because the white is that part which produces the flesh, the skin, and the feathers of the hen, while the yolk engendereth only the intestines. Therefore the white is like

unto flesh, and its special business is to produce it." He says also that the most perfect remedy for a great flux of blood from a wound is to stitch it close, and then take dry human blood-powder and lay it upon the wound. This is the same as the mummy of Paracelsus.

The reference made by Paré as to the value of the instruction which he obtained in the Hôtel Dieu is perhaps the first allusion to the importance of hospitals as a means of furnishing instruction in surgery. Hospitals had existed since before the Christian era in India, and those in Persia under the Nestorians were really used for educational purposes in connection with their medical schools. The foundations of many European hospices and hospitals date from the tenth and twelfth centuries, such, for example, as the San Spirito at Rome and St. Bartholomew's and St. Thomas's in London, some of the impulse to the forming of such institutions apparently having come from the need of providing them for lepers.

No surgical instruction appears to have been given in the hospitals of the Middle Ages, except that the surgeons connected with them may have employed some of their apprentices to assist them in the bandaging and in the dressing of wounds; but what we know as "clinical surgery" was an affair of much later date.

Of the immediate pupils and followers of Paré, the most important were Pierre Pigray (1533–1613), whose published works are mainly abstracts and translations of Paré; and Jacques Guillemeau (1550–1612), surgeon of Charles IX., Henry III., and Henry IV., and surgeon of the Hôtel Dieu, who acquired fame as a writer and teacher in surgery, obstetrics, and ophthalmology. His *La chirurgie françoise* (Paris, 1594, folio) was translated into Dutch, and thence into English, and published at Dort in 1597 under the title of *The French Chirurgerye*, forming a beautifully printed and illustrated folio, which was much the best work on this subject which had then appeared in English. Guillemeau was unusually well educated for a surgeon of those days, having studied under Riolan as well as under Paré, and he tried to harmonize the statements of the latter and those of his opponent, Gourmelin, by saying that Galen recommends the cautery in amputation for gangrene, and approves the use of the ligature for hemorrhage when there is no corruption.

Paré in advising the application of the ligature says it does not matter if some other tissue besides the vessel is included in it; but Guillemeau says that a portion of such tissue is to be included: "prenant quelque portion de chair ensemble," evidently thinking that this is an important feature of the operation.

His chapter on aneurism contains an account of a case of traumatic aneurism at the bend of the elbow in which he applied a single ligature above the swelling with success. In this case the aneurism had ruptured, and after ligating the artery he opened it further and turned out the clots. This one ligature was placed three fingers'-breadth above the tumor. Paré's description of the operation also refers to the use of but one ligature, and not to the operation of Antyllus.

There were no surgeons of repute in Germany prior to the middle of the fifteenth century; they were almost all barbers, who could neither read nor write. In 1868 there was for the first time published a manuscript treatise on surgery written in German about 1460

by Heinrich Pfolzprundt, and entitled *Bundth-Ertznei*. This, the oldest German work on surgery at present known, relates mainly to the treatment of wounds, but it contains a remarkable chapter on the making of a new nose from the skin of the arm after the method of Branca. There is an allusion to the burning of wounds by powder, but no reference is made to lithotomy or to operations for hernia. It gives a receipt for a narcotic mixture to be inhaled from a sponge similar to that mentioned by Guy de Chauliac. The first German surgeons of repute whose works have come down to us are Hieronymus Brunschwig, and Hans von Gersdorff, called Schylhans or Schielhans, both being surgeons at Strasburg in the last half of the fifteenth century. Brunschwig was born about the middle of the fifteenth century, and published at Strasburg in 1497 a folio volume with the title *Dis ist das buch der Cirurgia, Hautwirck der Wundartzny von Hyeronimo brunschwig.* Of this there were eight other editions, the last at Augsburg (1539, quarto). The Washington Library has the folio editions of 1508 and 1513 and the quarto editions of 1533 and 1539; also the English translation of 1525, and a Dutch translation in folio printed at Utrecht in 1535. The English translation is the first book on surgery in English, and its title-page is a curiosity in itself. It begins as follows:

"The noble experyence of the vertuous handywarke of surgeri practysyd & compyled by the moost experte Mayster Jherome of Bruynswyke borne in Straesborowe in Almayne ye whiche hath it fyrst proved and trewly founde by his awne dayly exercysynge."

This title is the work of the unknown translator, who has also given a short preface, in which he says that "it is oftentymes sene and dayly chaunceth in small townes, borowghs and villages that dyverse people hurt or dyseased for lacke of connynge men be taken in hande of them that be barbers or yonge maisters to whome this sciens was never dysclosed, not thynkynge on the wordes of the olde lernyd men that say, It is not wel possible to man that he sholde brynge well to a good end the thynge whiche he never or hath but lytell seen."

Brunschwig's book was the first in which any definite statement is made about gunshot wounds, or, as the English translation has it, "of woundis shot with a gone whereas the venym of the powder abydyth in." To remove the venom he advises to pass a small cord of hair through the wound and draw it back and forth, after which a tent is to be placed in the wound.

In amputation he advises either the actual cautery or boiling oil to check hemorrhage. He has nothing to say about lithotomy, herniotomy, aneurism, or tumors—the book being, in fact, a treatise on the military surgery of those days. It is illustrated with large quaint wood-cuts which are among the earliest specimens of the art. Haeser says there were two English translations—one published at London, and the other at Southwark, but these are the same work.

Hans von Gersdorff was an army surgeon in 1476–77, and published his book, *Feldtbuch der Wundtarzney* (in folio), at Strasburg in 1517. Of this there were eight later editions and translations into Latin and Dutch. The Washington Library contains the first edition, and also the Strasburg editions of 1527 and 1540 and the Frankfort edition of 1551. Gersdorff treats more fully of shot-wounds than does Brunschwig.

He does not consider them to be poisonous, but gives detailed directions for finding and extracting the bullet, with figures of instruments, and advises that the powder be removed, after which warm linseed oil is to be poured into the wound. He says: "I do not know of any better or milder remedy than this, which I have learned from Master Nicolaus, called the Maulartzt, surgeon to Duke Sigmund of Austria." If amputation becomes necessary, he says: "First of all advise the patient to resign himself to God, to confess his sins, to remember the suffering of our Lord with thanks, and the surgeon the same; thus will God grant him good fortune in his work. And when you will cut him have ready by each other all your instruments and apparatus, such as scissors, knife, saw, styptics, bands (lassbendel), bandages, pads, tow, eggs, and what belongs to it, so that one follows the other in the order of the operation, since there is need of this. And when you are ready to cut let some one draw back the skin strongly and tie a band firmly around it, and place another band in front so that a space of a finger-breadth be left between the two bands that you may cut between them with the knife; then this cut is quite sure, easily made and makes a good stump. When you have made the cut take a saw and divide the bone, and then remove the band and tell some one to draw the skin over the bone and flesh and hold it tight in front; and you should have a bandage two fingers broad and well wetted that it may lie smooth, and with it bandage the thigh down to the cut that the flesh may go in front of the bone, and leave it thus bound. And you need not fear bleeding if you have done as above described. Bind now over the styptic a good thick pad, take the bladder of a bull, ox, or hog, one which is strong, cut the neck open so that it will go over the pad and stump, and the bladder should be wet but not too soft; draw it then over all, tie it hard with a band and you need have no care about the bleeding."

The following is the styptic referred to: "Take of unslacked lime two ounces, vitriol, alum, each, one ounce, of aloes to be calcined, gall-nuts, colophony each a quarter of an ounce; of the residuum in the retort when you make aquafortis two and a half ounces, and the white hair of the belly of a hare or deer chopped up, and mix all together thoroughly. When you use it mix it with white of eggs. . . . . But if an artery rages and will not be staunched then burn it with a cautery." Although he used no ligature in amputation, he does advise a double ligature on a wounded blood-vessel. He has a chapter on leprosy, but says nothing definite about syphilis. The plates in Gersdorff's book are especially interesting.

Walter Hermann Ryff was also a Strasburg surgeon of the first part of the sixteenth century, and published a number of treatises in German, his *Gross Chirurgei* appearing in 1545, and his *Kleiner Chirurgi* in 1551. This tendency to depart from scholastic methods received a strong impulse from the sayings, doings, and writings of Philippe Aureole Theophrastus Bombastes de Hohenheim, better known as Paracelsus (1493–1541). He was born in the village of Einsiedeln, near Zurich, studied medicine with his father, travelled extensively, studied chemistry and alchemy with Sigismund Fugger, and served as an army surgeon in campaigns in Italy and the Netherlands. Of unbounded self-assurance and having a knowledge of some new remedies, such as antimony, arsenic, and mercury, he soon acquired a great reputation, and in 1526 was appointed professor of medicine in the University of Basle. He is characterized by Dalton as "a rampant, blatant, boasting, ignorant vagabond, with a face of brass and a tongue like a race-horse," and, if the word "ignorant" be omitted, it is a true picture. But he was also a sort of genius, in a way a poet; and, knave and charlatan, and in his latter days drunkard, though he was, his doctrines were accepted by such men as Frobenius, Erasmus, and Van Helmont, and had a powerful influence throughout Europe for a century or more, some of his peculiar theories still surviving as the essence of modern homœopathy. He wrote or dictated many works, of which the only one that need be mentioned here is *Der grossen Wundartzney* (1536–37), of which there were several editions, besides Latin and French translations. The second chapter begins as follows: "It is necessary to know in the first place what is the efficient cause of the curing of wounds, because this may of itself indicate the proper treatment. Know then that the human body contains in itself its own proper radical balsam, born in it, and with it, and not only the body as a whole contains it, but all its parts, such as flesh, bones and nerves, have each its own peculiar juice competent to cure wounds. . . . . It is not the surgeon who cures wounds, it is the natural balsam (or juice) in the part itself." Hence he inveighs against what he calls "the damnable precept which teaches that it is necessary to make wounds suppurate." Elsewhere he calls this animal juice "la mumie," but he also meant by this a special preparation made from certain parts of the human body—something like the animal juices and extracts which have been recently recommended as remedies, and which are quite Paracelsian in character.

The ideas of Paracelsus were accepted by Felix Wurtz (1514–74) of Basle, who studied under Ryff at Nuremberg, and was on terms of intimacy with Paracelsus and with Conrad Gesner, the most learned man of his time. He acquired great reputation, and published his *Practica der Wundarzney* in 1563. Of this about fifteen editions appeared during the next hundred years, including an English translation by Fox, published in 1656. He remarks that "skill in surgery is obtained with great painfulness, for it is not gotten with sitting on a cushion at home and by reading and writing; . . . . it is not enough to be full of talk, and to say such and such and write so and so,—a patient is little the better for it if the surgeon hath no skill to dress his wounds." The work is almost entirely devoted to wounds and fractures and their consequences, and contains nothing as to the technique of surgical operations. The treatment advocated is in the main simple and sensible. Styptic powders are condemned for general use, as is also the cautery to suppress hemorrhage, except in amputation of the thigh. No allusion is made to the ligature, and it is not probable that he had ever seen the works of Paré. He objects to the probing of wounds, declaring that it is folly to feel and grope about them, and that some surgeons use the probe merely because they have seen it used and to show that they are doing something. Cataplasms and poultices for fresh wounds are condemned, and the blood is not to be washed or squeezed out, "for it is a right flesh glue and hasteneth the healing." He often refers to the conservative surgeons

who say, "Old customs should not be abandoned," and says, "Therefore in some places the books of Theophrastus Paracelsus (to whom the best and most famous surgeons must give place) are prohibited to be read; but in my simple judgment it is done very foolishly." He objects to drawing a cord through a gunshot wound, or to using hot oil, or to treating such injuries otherwise than as simple wounds. The third part of his book, being on the symptoms and complications of wounds, including a description of the wound-fever or pyæmia, is the most original and valuable part of the work.

The instruction of the barber surgeons' apprentices at the end of the sixteenth century appears to have been based on the views of Jerome of Brunswick, if we may judge from a little manual by Julius Holder, published at Frankfort in 1592, entitled *Dialogus, ein Nützliche und Warhafftige Beschreibung eines rechte Wundartzts unnd seiner Meisterschaft.* This is in the form of questions and answers, Latin terms being curiously intermixed with the German.

Another good specimen of the sort of instruction given to apprentices of German barber surgeons in the sixteenth century is the *Wundartzney zu allen gebrechen des gantzen Leibs, etc.* of Joannes Charethanus (or Charetanus), of which five editions appeared between 1530 and 1556. The edition of 1549, printed at Frankfort, is a small quarto of 20 leaves, giving directions for bloodletting and tooth-pulling, and various formulæ for salves and potions. It directs that wounds should be dressed twice a day; that he who is wounded in the head shall not walk about or move much; that he shall avoid perspiring and talking, which inflame or disturb the brain and make him insensible; above all, he shall avoid strong wine, which puts him in deadly peril; likewise the rays of the sun and light and heat and indigestible meat and the society of woman, whom he shall not even look upon.

If a large artery is cut or opened, first secure the same carefully with a silk thread to stop the bleeding; then lay on the red powder and cover with a red plaster. Let it remain for four days and heal it like other wounds.

The Seventeenth Century.

The seventeenth century is more remarkable for the advances which were made in physics and in physiology than it is for improvements in surgery. It was the age of Francis Bacon (1561–1626), of Galileo (1564–1642), of René Descartes (1596–1650), of Pascal (1623–62), of Sir Isaac Newton (1642–1727), and of Robert Boyle (1626–91), all of whom had a powerful influence in developing the iatro-chemical and iatro-mechanical theories which prevailed about the end of the century. This was also the age of Borelli (1608–79), of Thomas Sydenham (1624–89), and, above all, of William Harvey (1578–1657), the pupil of Fabricius d'Aquapendente, whose celebrated work, *Exercitatio Anatomica de Motu Cordis et Sanguinis*, appeared in 1628.

At the commencement of this century the most distinguished Italian surgeon was Hieronymus Fabricius d'Aquapendente (1537–1619), who was a pupil of Fallopius and succeeded him as professor of anatomy at Padua. He was the discoverer of the valves of the veins and the teacher of Harvey. His principal discoveries and writings relate to anatomy

and embryology, but he was also professor of surgery, and his *Pentateuchos Chirurgicum* (Francof., 1582) and his *Opera Chirurgica* (Paris, 1613, in folio, and later editions) were important works of reference during the next century. Fabricius was learned and eloquent, and made the University of Padua the most important school for anatomy and surgery in Europe. His surgery is mainly that of Celsus, Paul of Ægina, and Albucasis, to whom he gives full credit, carefully noting the sources of his quotations. No great advance in the art is due to him, but his works contain many accounts of cases and references to the methods of other surgeons, making them valuable historically, and they are far more interesting as a piece of literature than is the corresponding work of John de Vigo. In speaking of wounds of the intestines he refers to animal sutures and to the insertion of a piece of the trachea of an animal to preserve the lumen of the gut. He describes tracheotomy and urges its performance in certain cases, and says that he has seen one case of cancer of the breast cured by excision, but has never performed the operation himself.

Next to him came Cesare Magati (1579–1647), who became professor at Ferrara in 1612 (or 1621?), and who gained much repute by his book, *De rara medicatione vulnerum, seu de vulneribus raro tractandis* (libri ii., Venet., 1616, folio). In this he urged a simpler mode of treating wounds than was then fashionable, advising less frequent dressings, condemning the use of tents, and maintaining that gunshot wounds are not poisoned. His doctrines were specially urged and made prominent by Sancassini in the early part of the eighteenth century.

Marcus Aurelius Severinus (1580–1656), professor at Naples, one of the most celebrated teachers of anatomy and surgery of his time, is best known by his book *De recondita abscessuum natura* (Naples, 1632, quarto), of which several later editions were published.

Giovanni Battista Cortesi (1554–1636), a barber's apprentice, afterward a pupil of Tagliacozzi, whom he succeeded as professor at Bologna, published a treatise on wounds of the head in 1632, and a manual of surgery in 1633, which are of little interest.

Gaspar Asellius, the discoverer of the lacteals, in 1623 was professor of surgery and anatomy at Pavia, but wrote nothing on surgery.

Spigelius (1578–1625), a native of Brussels, professor of anatomy and surgery at Padua in 1605, was an operator, and is said to have trephined the same patient seven times, but there is nothing surgical in his published works. Trephining was a common operation at this time, being employed in cases of insanity, of severe headache, and of chronic diseases of the eyes, as well as for injuries of the skull.

Pietro de Marchetti (1589–1673), professor of surgery at Padua, published a collection of cases under the title *Observationum medico-chirurgicarum sylloge* (Padua, 1664, and later editions), which is of permanent historical value. Among these cases is one of successful trephining following a dagger-wound of the head two or three months previous, and several cases of the same operation for headache. Here also is the celebrated case in which a pig's tail was forced into the anus of a prostitute, and was removed by slipping a tube over it. Pietro was succeeded in the chair of surgery in 1662 by his son Dominique, who acquired great fame as a teacher, and is said to have performed nephrot-

omy successfully without being guided by the presence of any tumefaction of the part.

Filippo Masiero, a surgeon of Padua, was the author of the following books: *Il chirurgo in prattica, etc.* (Venet., 1688, 4to; 5th ed. 1749, 8°), *Il sogno chirurgico* (Parts I., II., Padua, 1697), and *Opere chirurgische* (Padua, 1707).

Carolus Musitanus, a physician of Naples, published his *Chirurgia theoretica practica* in 1698. Haller styles him "improbabilium historiarum narrator."

In France there was little progress in surgery until near the end of the century. The medical faculty finally triumphed over the surgeons by obtaining a decree which united the barbers and the surgeons in one corporation, and the College of St. Côme was no longer a power in the land. Among the French works on surgery of this period may be mentioned *Quelques traités des opérations de chirurgie*, by Jean Girault (Paris, 1610); *Observations Médecinales et Chirurgicales, etc.*, of Gul. Loyseau (Bordeaux, 1617); *Observations iatrochirurgiques* of Covillard (Lyon, 1639) and *Le Chirurgien Opérateur* of the same author (1633 ?; 2d ed. Lyon, 1640); *Epistola de laryngotomiâ* of René Moreau (Paris, 1646); *La Chirurgie Militaire* of Leonard Tassin (Nimwegen, 1673); *Les opérations de la chirurgie* of J. Bienaise (Paris, 1688); and *Traité des playes d'arquebusade* of Scipio Abeille (Paris, 1695).

In 1696, M. de la Vauguion, a physician, published a *Traité complet des opérations de chirurgie* (8°, Paris), which is the most complete manual in French prior to that of Dionis, and of the English translation of which at least three editions were published (1699, 1707, and 1716). He names the tourniquet and describes its application in amputation and in the operation for aneurism, and quotes frequently from Fabricius Hildanus.

Nicolas de Blegny (1652–1722), surgeon of the duke of Orleans in 1683, the founder of the first medical journal, published a treatise on venereal diseases in 1673, and a treatise on the treatment of hernia, with description of a truss of his invention, in 1676. He is also the author of the first city directory.

Previous to the seventeenth century surgery had made little progress in the Netherlands, and there are very few books to be noted. The work of Ypermans has already been referred to. Carolus Battus, a surgeon of Dordrecht, published in 1590 his *Handtboeck der Chirurgijen*, of which there were six later editions. He also translated the works of Paré into Dutch.

In the middle of this century Holland became celebrated as a centre of anatomical and surgical teaching through the labors of Tulp, Barbette, Van Meekren, Van Horne, Van Roonhuysen, Solingen, Verduyn, and others, and the schools of Amsterdam and Leyden began to draw students from all parts of Europe.

Paul Barbette (162?–7?), son of a Strasburg surgeon, studied in Montpellier and Paris and settled in Amsterdam. He was a voluminous writer, and his *Chirurgia*, first published in Dutch in 1657, passed through ten editions and translations, being a popular manual, while his *Opera omnia* was issued twenty-two times in various languages. He first described femoral hernia, suggested laparotomy in intestinal obstruction, and extirpation of the spleen, which he performed on dogs.

Job Janszoon Van Meekren (?–1666), a native of Amsterdam and a pupil of Tulp, was a celebrated operator. His book, *Heel en genceskonstige aanmerkingen* (Amst., 1668), was translated into German and Latin.

Joh. van Horne (1621–70), professor of anatomy and surgery in Leyden, was a distinguished teacher, but his writings relate mainly to anatomy, his *Microtechne id est brevissima Chirurgiae Methodus* (1663) being merely a manual. There is an English translation of this (London, 1717).

Hendrik van Roonhuysen (1625–6?), a surgeon of Amsterdam, also well known as an obstetrician, published his *Genees-en Heelkonstige aanmerkingen* in 1672. He operated for wry-neck and hare-lip, advised Cæsarean section, removed tumors, and seems to have been specially skilled in his art.

Cornelis Solingen (1641–87), a surgeon at the Hague, wrote *Manuale Operatien der Chirurgie* (Amst., 1684), which Haller says is full of original observations.

Peter A. Verduyn (162?–?), a surgeon of Amsterdam, is celebrated for his treatise on the flap method of amputation, *Diss. de nova artuum decurtandorum ratione* (Amst., 1696). He seems to have known nothing of the similar methods of Lowdham. (See p. 67.)

Joannes Muys of Arnhem and Leyden published the first two parts of his *Praxis Chirurgiae rationalis* in 1683, and the complete work in 1695. This contains accounts of one hundred and twenty cases, some of which are curious and interesting.

Fabricius Hildanus (1560–1624) is sometimes called the "Father of German Surgery," although this title belongs more properly to Heister. He was a Swiss by birth, and for the last twenty years of his life was the city physician of Berne. He was a surgeon's apprentice who managed to acquire a good classical education, and probably obtained good practical training under Griffon, a surgeon of Geneva. He travelled much, resided for some time at Cologne, and became widely known as a bold and skilful operator, and especially as a lithotomist. He was a strong opponent of Paracelsus and his friend Wurtz, and was a voluminous writer, but his monographs are, for the most part, of little interest, the best being his *Lithotomia Vesicae* (Basle, 1626), translated into English and published at London in 1640. His most important publication for readers of the present day is his *Observationum et Curationum Chirurgicarum Centuriae*, in which he relates his experience in a large number of surgical cases of the most varied character. He advised amputation at an early stage in gangrene, and that the incision should be made in the sound and not in the decayed flesh.

He used the cautery, and not the ligature, in wounds of the arteries, and devised a number of complicated instruments, none of which are of practical interest. His chief influence on surgery was through his correspondence with German physicians and surgeons, and through his urging upon the German surgeons the necessity for the study of anatomy. His *Opera omnia*, of which several editions were published, appears to have been a favorite book of reference for surgeons for many years.

John Schultes, better known as "Scultetus" (1595–1645), a pupil of

Fabricius d'Aquapendente, became city physician at Ulm. His great work, the *Armamentarium Chirurgicum* (Ulm, 1653, folio), passed through many editions and was translated into many languages.

Joseph Schmidt (1601–?), an army surgeon, published *Speculum Chirurgicum* (Ulm, 1656, quarto) and *Examen Chirurgicum* (Francof., 1660, 16°).

The most celebrated German surgeon of the latter part of this period was Matthæus Gottfried Purmann (1649–1711 ?), who was apprenticed as a barber surgeon, became a medical officer in the Brandenburg army in 1675, and city physician at Breslau in 1685. He was a voluminous writer, and his *Grosser und gantz neu-gewundener Lorbeer-Krantz, oder Wünd-Artzney* (Francof., 1692, 4to; also 1722), his *Chirurgia Curiosa* (Francof., 1694, 4to; translated into English, London, 1706, fol.), and his *Funfftzig sonder- und wunderbahre Schusswunden Curen* (Francof., 1721) are valuable works in the history of the art. He was a strong advocate of the cure by the weapon-salve and the sympathetic powder, and tells several stories of the successful use of these remedies. He used styptics and bandages to control hemorrhages after amputations, objecting to the cautery, but says nothing about the ligature.

Here may also be mentioned John von Muralt (1645–1733), a distinguished Swiss anatomist and surgeon, who was one of a celebrated family of physicians of Zurich. He studied at Basle, Leyden, Oxford, and Paris, and in 1761 returned to Zurich, where he soon became distinguished as an anatomist and surgeon. In 1677 he announced public lessons in anatomy, with demonstrations on the bodies of criminals and of persons dying of remarkable diseases in the hospitals, and in the same year published his *Vade Mecum Anatomicum*, giving the date by the enlarged letters in the motto of the book, "LVX et faX MeDICinæ." In the second edition of his surgical writings, published in 1711, he describes a method of amputation by flap devised by Saborian in Geneva, who first performed it in 1701, and this is by some claimed to be the first mention of that method of operation, but it had already been described by Yonge in 1679. (See p. 67.)

Other German surgeons of this period were Mathias Ludwig Glandorp (1595–1636), whose *Speculum Chirurgicum* appeared in 1619; Jessenius a Jessen (1566–1621), author of *Institutiones Chirurgicae* (1601); Paul Ammann (1634–91), author of *Praxis vulnerum lethalium* (Francof., 1690); Joh. Agricola (1589–164?), author of *Chirurgia parva* (Nürnberg, 1643); and John H. Jungken (1648–1726), author of *Compendium Chirurgicae Manualis absolutum* (Francof., 1692).

The oldest English medical book which we have is perhaps the *Leechbook*, written about 970 A. D., and printed in 1865 as volume ii. of the *Leechdoms, Wortcunning, and Starcraft of Early England*. This is mainly the receipt-book of a herbalist, giving the uses of common herbs, and among other things the composition of various "wound-salves." But it also contains matters taken from Paul of Ægina, and directs: "If thou must carve off or cut off an unhealthy limb off from a healthy body, then carve thou not it on the limit of the healthy body, but much more cut or carve in the hole and quick body." The following is the best surgery in the book: "For hare-lip, pound mastic very small, add the white of an egg, and mingle as thou dost vermillion; cut with a knife the false

edges of the lip, sew fast with silk, then smear without and within with the salve, ere the silk rot. If it draw together, arrange it with the hand; anoint again soon."

In the book of *The Physicians of Myddvai*, which dates from about the thirteenth century, there are a few references to surgical operations. The author says (page 40): "A wounded lung is the physician's third difficulty, for he cannot control it; but he must wait for the will of God. By means of herbs a medicine may be prepared for any one who has a pulmonary abscess [empyema]. He should let out [the matter] and support [the patient] as in the case of a wounded lung, till he is recovered. But most usually he will have died within eleven years [or one year]." Page 44: "A hard vesical calculus is thus extracted by operation: Take a staff and place it in the bend of the knee; then fix both arms within the knees, doubling them over the staff, and securing both wrists with a fillet over the nape of the neck, the patient (being placed on the back), his stomach up, with some support under both thighs, and the calculus cut for on the left side of the urethra. Let him subsequently be put in a water-bath that same day, also the day following early, and after this he should be put in the kyffeith. Then he should be removed to his bed, and laid there on his back, his wound being cleaned and dressed with flax and salt butter. He should be kept in the same temperature until it be known whether he shall escape [effects of the operation]. He should be kept without food or drink for a day and a night previous to the operation, and should have a bath."

The following is the direction for an anæsthetic (page 423): "Take the juice of orpine, eringo, poppy, mandrake, ground-ivy, hemlock, and lettuce, of each equal parts. Let clean earth be mixed with them and a potion prepared, then without doubt the patient will sleep. When you are prepared to operate upon the patient, direct that he shall avoid sleep as long as he can, and then let some of the potion be poured into his nostrils, and he will sleep without fail.

"When you wish to awake him, let a sponge be pounded in vinegar and put in his nostrils.

"If you wish that he should not wake for four days, get a penny-weight of the wax from a dog's ear, and the same quantity of pitch; administer it to the patient and he will sleep.

"When you would that he should awake, take an onion, compounded with vinegar, and pour some into his mouth, and he will awake. Take care that you keep him quiet, and warned of the operation, lest he should be disturbed."

The first surgeon in England of whom we have any definite account, and whose writings still exist, was John of Arderne (or Arden), born about 1308, who practised in Newark until about 1370, when he went to London. He wrote a treatise on surgery of which several manuscript copies are in existence, but the only work of his which has been printed is *A treatise of the fistula in the fundament, or other places of the body, etc.*, which is included with the translation of Arcæus on wounds of the head, etc., printed in London in 1588, being a translation by John Read. His operation itself consisted either of slitting up the fistula or of passing a thread through it, which is to be drawn so as to cut through the flesh gradually.

His description of cancer of the rectum is a graphic one, and begins as follows:

"Bubo is an Apostume breding within the fundament in the longation with great hardness, but with little paine. This before his ulceration is nothing but a hid Cancer, which cannot in the beginning be knowne by sight of the eye, for it is hid within the fundament, and therefore it is called Bubo. For as an Owle hideth her self in the darke places, so this griefe lurketh within in the beginning.

"But after processe of time it is ulcerat and frettith and goeth out, and oftentimes it frettith and ulcerith all the circumference of the fundament, so that the excrements goeth out continuallie without retencion, and may never be staied unto the death, nor cured by the healpe of man. And it is thus knowen.

"Put your finger within the fundament of the pacient, and if ye finde within a thinge very harde, sometime on the one side, and sometime on both, which hindreth egestion, than it is Bubo.

"And the manifest signs are these. The patient cannot abstaine from stoole, for aking and priking, and that twise or thrise within an houre, and the excrementes seeme as it were mingled with watrie bloud, and it stinketh very strongly, so that all the unskilfull surgions and the patient also thinketh they have Dissenterium, when truely it is nothing so, for Dissenterium is with flux of the belly, but in Bubo there goeth foorth hard egestion and sometime they may not goe out for straightnesse of the Bubo, but are reteyned within the fundament straightly so that ye may feele them with your finger and drawe them out, and in this case glisters availeth much.

"And when they bee nigh their ende, they beginne to have lyngering fevers, and to loose their appetite, they forsake all, and covet wine, they eate little and covet everieday lesse and lesse, they sleepe but little and unquietly, they are heavie as well in minde as in body, and as they waxe weaker and weaker, they covet their bedde and above all thinges to drinke water, neverthelesse they can speake and move themselves to the last breath.

"From these (I say) wash your handes if you have care of your credit, unlesse it be in glisters as aforesaide to ease him."

At the beginning of the fifteenth century there was a great dearth of surgeons in England, as it appears from Rymer's *Fœdera* that in 1417 Henry authorized "John Morstede to press as many surgeons as he thought necessary for the French expedition, together with persons to make their instruments.[1] With the army which won the day at Agincourt there had landed only one surgeon, the same John Morstede, who indeed did engage to find fifteen more for the army, three of whom were to act as archers."

Of the English surgeons of the fifteenth and sixteenth centuries, those whose names are best known are Vicary, Gale, Clowes, and Lowe. Thomas Vicary (149?–1561), the first master of the Amalgamated Barbers and Surgeons in 1541, and one of the first governors of St. Bartholomew's, published in 1548 a work on anatomy in English. No copy of this edition is known to exist, but the edition of 1577 was reprinted by the Early English Text Society in 1888. Thomas Gale (1507–86), a

[1] *The Antiquary's Portfolio*, by J. S. Forsyth, vol. i., London, 1835, p. 80.

native of London, served in the army of Henry VIII. in France in 1544, and under Philip II. of Spain in 1577, succeeded Vicary as master of the Barber Surgeons Company in 1561, and in 1563 published his *Institution of Chirurgerie*, with other treatises, one of which is *Of wounds made with Gonneshot*, in which he opposes the views of Brunswick, De Vigo, and Ferrius as to the venomous nature of such wounds, and quotes Maggius approvingly. He advises styptics in amputations—says that his method is used in St. Thomas's Hospital, and gives cases to prove that bullets may be left in the body without danger.

William Clowes (1540–1624) was at first a naval surgeon, and became surgeon of St. Bartholomew's in 1581. He wrote *A proved practise for all young Chirurgions concerning burnings with Gunpowder and Woundes made with Gunshot, etc.* (London, 1591, 8°; 3d ed. 1637, 4°). He refers to Paré as a man worthy of admiration, and, like Gale, comments severely on the ignorance of the so-called surgeons of his time. Peter Lowe (155?–161?), a Scotch surgeon, practised for a long time in France and Flanders and as an army surgeon. In 1596 he was in London, where he published his works on the *Spanish Sickness* and *The Whole Course of Chirurgerie*. In 1598 he returned to Glasgow, and founded the Faculty of Physicians and Surgeons of Glasgow, which was chartered by King James VI. in 1599. His book on surgery passed through four editions, and is a good manual for its time. In amputation for gangrene he used the actual cautery, but says: "In amputation without putrefaction I finde the ligature reasonable sure providing it be quickly done." This is perhaps the first mention in English of the ligation of arteries in amputation. In hernia he advised the pricking of the intestines with a needle to discharge the wind and lessen the bulk of the tumor.

About the middle of the sixteenth century there lived at Maidstone, Kent, a surgeon named John Halle, who published in 1565 a translation of the *Chirurgia parva* of Lanfranc, with some remarks of his own, entitled *An Historical Expostulation also against the beastly abusers, both of Chyrurgerie and Physicke in our tyme: With a goodly doctrine, and instructions necessary to be marked and followed of all true Chirurgies.*

The history of surgical corporations in England begins with the barbers' guild, which was at first a meeting for social and religious purposes, originating probably in the thirteenth century. These barbers soon began to call themselves barber surgeons. There were, however, surgeons who were not barbers, some of whom had served in the army, and in 1368 these surgeons formed a separate guild, which about 1421 combined with the physicians.[1] The barbers obtained a charter of incorporation from King Edward IV. in 1462.

There is nothing in the charter about barbery—that is, shaving and hair-cutting—but a good deal about the regulation of surgery. In 1492 arms were granted to the "Guild of Surgeons," which appears to have been a small body of eight or ten men superior in social position to the

[1] The details of the quarrels between the barbers and the surgeons, and of the organization and progress of the guilds, will be found in *The Annals of the Barber Surgeons of London*, compiled by Sidney Young (a thick quarto volume published in 1890), and in *The Craft of Surgery*, by J. Flint South (published in 1886). The act of Parliament passed in 1540, allowing the United Companies of Barbers and Surgeons to have yearly four bodies of criminals, was the first law in the country for promoting the study of anatomy.

barbers. In 1540, under the reign of Henry VIII., the barbers and the surgeons were united and incorporated by act of Parliament as the Company of the Barber Surgeons, the first master being Thomas Vicary.

In the year 1542 an act was passed regulating the practice of surgery, stating that "the Company and Fellowship of Surgeons of London, minding their owne lucres, and nothing the profit or ease of the diseased or patient, have sued, troubled, and vexed divers honest persons, as well men as women, whom God hath endueed with the knowledge of the nature, kind and operation of certain herbs, roots and waters, and the using and ministering of them, to such as have been pained with custumable diseases, as women's breasts being sore, a pin and the web in the eye, uncomes of the hands, scaldings, burnings, sore mouths, the stone, stranguary, saucelin, and morphew, and such other like diseases. . . . . And yet the said persons have not taken anything for their pains or cunning. . . . . In consideration whereof, and for the ease, comfort, succour, help, relief, and health of the King's poor subjects, inhabitants of this his realm, now pained or diseased, Be it ordained, etc. that at all time from henceforth it shall be lawful to every person being the King's subject, having knowledge and experience of the nature of herbs, roots and waters, etc., to use and minister according to their cunning, experience and knowledge, ... the aforesaid statute . . . . or any other Act notwithstanding."

The Barber Surgeons had public demonstrations of anatomy and dissections in their hall, but it was forbidden that any of them should make dissections or give lectures on anatomy at any place other than said hall. The reader in anatomy was for many years a physician.

In 1604 the company was presented with five hundred copies of the *Tables of Surgery* of Horatius Morus, a Florentine physician, translated by Richard Caldwell[1] (London, 1585, 32 pp. 8°). These books were given by Mr. Caldwell to be distributed among the surgeons who were freemen of the company.

In 1643, Edward Arris gave to the corporation the sum of two hundred and fifty pounds for the purpose of having one human body publicly dissected and six lectures thereupon read each year.

The Gale Lectureship was founded by Dr. Gale, the order being issued in 1698. These two bequests are now combined and the lectures in connection with them are known as the Arris and Gale Lectures.

One of the lecturers before the Barber Surgeons was Alexander Read (or Rhead), a Scotchman, who graduated in 1620 at Oxford. His *Lectures on wounds* were published in 1634, those on *Surgical operations* in 1637, and all his works in 1650. Read taught that a bullet may be so made that it will make a poisonous wound, quoting as authority Quercetanus. Speaking of ligature of the artery, he says: "Ambrose Parrey would have this mean to be used after the amputation of a member, whom you may read; but in my judgment his practice is but a troublesome and dangerous toy; as he shall finde who shall go to make trial of it."

An important part of the business of the Corporation of Surgeons was

[1] The Dr. Caldwell referred to was Richard Caldwell, a graduate of Oxford and a physician, and president of the college in 1570. Through his influence Lord Lumley founded and endowed a lectureship on surgery, which is still known as the Lumleian Bequest.

the examining and licensing of naval surgeons, both for the royal navy and for merchant ships. An account of such an examination is given by Smollett in his novel *Roderick Random*. Oliver Goldsmith also presented himself for examination in 1758, and the minutes of the court of examiners read as follows: "James Bernard, mate to an hospital; Oliver Goldsmith, found not qualified for dito."

In Scotland the University of Aberdeen was founded in 1494, and in 1505 had a professor of medicine.

King James III. is reported to have been "ane singular gude chirurgian, and there was none of that profession if he had any dangerous cure in hand but would have craved his adwyse." His method of obtaining practice must have been effectual, although it was an unusual one. We find in the accounts of the treasurer for 1511 an entry as follows: "Item to one fallow, because the King pullit forth his tootht, xiiii. 5."

The first charter of the Royal College of Surgeons of Edinburgh is dated July 1, 1505. It directs that no person shall make use of the craft of surgery or of barber craft within this burgh unless he is freeman and burgess of the same, and that he must be examined by the masters of the same craft upon the following points—namely: The anatomy, nature, and complexion of every member in man's body, and all the veins of the same. Every year one executed criminal was to be given to the college for anatomical purposes. No master of the craft shall take any apprentice who cannot write and read. Probably the most important provision was, that no person within the burgh shall make or sell any aqua vite except the masters, members, and freemen of the corporation.

By 1589 it had become the custom to admit barbers at a lower rate, but they had only the right to act as barbers, being specially forbidden to practise surgery, and were to have "na signe of chirurgie in their bughts or houses oppenlie or privatlie."

In the early part of the seventeenth century the leading British surgeons were Clowes and Lowe, already referred to, and John Woodall (156?–164?), who had served as an army surgeon, and about 1612 was elected surgeon to St. Bartholomew's Hospital and likewise surgeon-general to the East India Company, which last gave him the appointing of surgeons and mates to all the company's ships. In 1617 he published a work entitled *The Surgeons Mate or Military & Domestique Surgery*. Discoursing faithfully & plainly the method and order of the Surgeons chest, the uses of the instruments, the vertues and Operations of the Medicines, and the exact Cures of Wounds made by Gun-shott, etc. In 1628 he published a work entitled *Viaticum, Being the Path-Way to The Surgeons Chest*. Containing, Chirurgical Instructions for the yonger sort of Surgeons, imployed in the Service of his Majestie, or for the Common-Wealth upon any occasion whatsoever. Intended chiefly for the better curing of Wounds made by Gunshot.[1] His

[1] These works were afterward published together in folio in 1639, 1653, and 1658, a separate title-page being given to each work, but the pagination being continuous. The second title-page is often transferred in place of the first one, which has been lost, leading, on careless examination, to the erroneous supposition that they are two entirely distinct works of the same date.

works are not specially instructive, but are in parts very good reading. In amputation he recommends tying large vessels, especially those of the thigh, if it can be done, but he seems to think that the surgeon will often fail, in which case, as well as for the smaller vessels, he recommends buttons of astringent and caustic powders.

In gangrene Woodall urged amputation in the mortified instead of the sound part—an old treatment which had then fallen into disuse. He also suggests amputating as low as the ankle for disease of the foot, instead of just below the knee, as was usually the case. He had never seen the actual cautery used in amputation.

In 1648, James Cook of Warwick published his *Mellificium Chirurgiae, or the Marrow of Surgery*, a manual which seems to have been popular, the sixth edition in 1717 being "licensed by the College of Physicians and fitted for the use of all sea-surgeons." In his description of amputation no mention is made of the ligature of arteries.

The greatest English surgeon of the seventeenth century was Richard Wiseman (1622–76), sometimes called the English Paré. He was apprenticed to a barber surgeon in 1637, served in the Dutch navy until about 1644, when he joined the army under Charles I., and was admitted to the Company of Barber Surgeons in 1651. He was a surgeon in the Spanish navy for three or four years, and in 1660 joined King Charles II. and was appointed one of his surgeons. In 1672 he published *A Treatise of Wounds* in an octavo of 277 pages. In 1676 this was enlarged and printed in a large folio volume under the title *Severall Chirurgicall Treatises*. There were eight of these treatises—viz. I. Of tumors; II. Of ulcers; III. Of the diseases of the anus; IV. Of the King's evil; V. Of wounds; VI. Of gunshot wounds; VII. Of fractures and luxations; VIII. Of lues venerea. In 1686 this was published in folio, having the words "the second edition" on the title-page, although it was really the third, and the so-called "third edition" (folio, 1796), with the title *Eight Chirurgical Treatises, etc.*, was really the fourth. Other editions appeared in 1705, 1719, and 1734, and there is a spurious edition of 1692, which is really the original edition of 1676 with a new title-page.

Wiseman used the complex dressings of the period, but knew that simple measures produced equally good results. He used styptics and cauteries, and not the ligature, but he included the end of the cut vessel in one of the stitches through the lips of the wound. Being a personal friend of the king, he used his influence with him to promote the interests of the Barber Surgeon's Company. His works were never translated, and were very little known on the Continent, but they had a decided influence on the improvement of the art in England.

James Yonge (or Young) (1646–1721), a native of Plymouth and a naval surgeon, published in 1679 a little book of 120 pages entitled *Currus Triumphalis, é Terebinthó. Or an account of the many admirable Vertues of Oleum Terebinthinae. More particularly, of the good effects produced by its application to recent Wounds." . . . . And lastly, A new Way of Amputation, etc.* He objected to Paré's method of ligatures in amputations, saying that it is "a way always tedious, often successless; and whatever vaunts the Author makes of it, it cannot be so secure as he pretends; it being liable (sometimes from the slackness, otherwise from the too great straightness of the thred; sometimes from its smallness, cutting through, or from its weakness, giving way) to a new flux when not so tolerable to the Patient, or so easily cured by the Artist as at first; moreover, where two Vessels or more bleed in one Wound (which is very frequent), the one must be neglected, while the Ligature is making on the other." But he says: "The ligation of an Artery on other accounts, as in the Toothach, Epiphora, Aneurisma, &c., is not hereby impugned." On page 30 is to be found, perhaps, the first printed description of a tourniquet—"very useful in Amputations, especially above the knee; that is to say a wadd of hard linnen cloth, or the like, inside the Thigh a little below the *Inguen*, then passing a Towel round the member; knit the ends of it together, and with a Battoon, a Bedstaff, or the like; twist it, till it compress the Wadd or Boulster so very strait in the crural vessels that (the circulation being stopped in them) their bleeding when divided by the Excision, shall be scarce large enough to let him see where to apply his Restrictives." A similar tourniquet had, however, been used by John Morell in 1674 at the siege of Besançon. The "new way of amputation" is by a single flap, and is the first printed description of this method, which he says he learned from Mr. C. D. Lowdham of Exeter.

The *Compleat Discourse of Wounds, ... as also a Treatise on Gunshot Wounds in General*, by John Brown (surgeon to the king) (London, 1678, 4to), is a pompous, diffuse, tedious book, containing nothing of any importance.

Some curious illustrations of the English surgery of the middle of the seventeenth century are to be found in the *Diary of the Rev. John Ward, Vicar of Stratford-upon-Avon, extending from 1648 to 1679*, edited by Charles Severn (London, 1839, 8vo). For example: "A cancer in Mrs. Townsend's breast, of Alverston, taken off by two surgeons. . . . . First they cutt the skin cross and laid itt back, then they workt their hands in ytt, one above and the other below, and so till their hands mett, and so brought itt out. . . . . There came out a gush of a great quantitie of waterish substance, as much as would fill a flaggon. They put in a glass of wine and some lint, and so let itt alone till the next day; then they opened itt again, and injected myrrhe, aloes, and such things, as resisted putrefaction, and so bound itt up againe. . . . . The way how and where itt should be cutt was markt with ink by one Dr. Edwards."

"Gill told mee of a woman that had an apostheme about the side, and his master intended to trepan her on one of the ribs; whether it canne be;—I suspected itt to be a ly."

"The mountebank that cutt wry necks, cutt three tendons in one child's neck, and hee did itt thus; first by making a small orifice with his launcet, and lifting upp the tendon, for fear of the jugular veins, then by putting in his incision knife, and cutting them upwards; they give a great snapp when cutt. The orifice of his wounds are small, and scarce any blood follows."

"Gill said his Mr. Day hath amputated five armes, three leggs and somewhat else since he came to Oxford, and but two of all these died, and one was a person of sixty years att least."

"John Phillips his child had a red swelling in the forehead, I sup-

pose a varix or naevuss and itt was taken off by one of Coventry, by tying a hair about itt, and girding itt harder every day; in two weeks itt fetcht itt off."

A curious episode in the history of surgery in the first half of the seventeenth century is the controversy on the sympathetic or magnetic cure of wounds. This was a doctrine of Paracelsus, and in 1608 one of his followers, Goclenius, professor of medicine at Marburg, called special attention to it by his work, *Tractatus de Magnetica Curatione Vulneris*. His doctrines were objected to by the priests on religious grounds. Van Helmont wrote in defence of the doctrine, and his pamphlet was published without his knowledge in 1621. This created great excitement, and was translated into English by Walter Charleton, and published in 1560 under the title *A ternary of Paradoxes*. The cure was to anoint the bloody sword or other weapon which had inflicted the injury, or a stone or cloth dipped in the blood as it flowed from the wound, with a special ointment, and put it away carefully, applying nothing to the wound but a bit of wet lint. Goclenius thought the cure was a natural process; the priests thought it was due to magical formula and the aid of the devil; and Van Helmont undertook to prove that both were wrong, and that the so-called "weapon cure" was due to a certain mysterious sympathy precisely analogous to what, in later times, was called "animal magnetism."

The priests' view that weapon-salve cures are magical and sinful is given in the *Hoplocrismaspongus; or a sponge to wipe away the weapon-salve*, by William Foster, Parson, etc. (London, 1631), which was directed mainly against the celebrated Rosicrucian Robert Fludd, who replied with *Doctor Fludds answer unto M. Foster*, or the squesing of Parson Foster's sponge, ... wherein the sponge-bearer's immodest carriage and behaviour towards his brethren is detected, etc. (London, 1631). Fludd's book is much better reading than that of Foster.

Sir Kenelm Digby's discourse at Montpellier, on the cure of wounds by the powder of sympathy, published in 1657, was a famous book in its day. A less-known but equally curious book, by C. de Irvine, an army surgeon, was printed at Edinburgh in 1656 under the title of *Medicina Magnetica, or the rare and wonderful art of curing by sympathy*, and several other controversial pamphlets of the period are noted in the Index Catalogue of the Washington Library under the heading "Sympathy."

After the expulsion of the Moors from Spain there is little worth noting in the history of surgery in that country until after the middle of the sixteenth century. In 1488 it was ordered that those wishing to practise surgery must be examined under the direction of the Brotherhood of St. Cosme and St. Damian at Zaragoza, to which association was granted the privilege of dissecting the bodies of persons dying in the hospital recently established in that city. The surgeons were forbidden to order or to dispense internal remedies. At the end of the fifteenth century there were a few Spanish writers on syphilis, the best known being Villalobos.

The first celebrated Spanish surgeon was Francis Arcæus (1493–157?), whose treatise, *De recta curandorum vulnerum ratione*, written in his old age, was first published at Antwerp in 1574 and again at

Amsterdam in 1658. This was translated into English by John Read, and published at London in 1588, and a Dutch translation was published in 1667. Arcæus recommends the use of the trephine in fractures of the skull, describes with some minuteness the operation for excision of cancer of the breast and an apparatus for the treatment of club-foot, and advises mercurial inunctions on the joints for syphilis. His treatment of wounds is, in the main, that of John de Vigo.

Another Spanish surgeon of the sixteenth century of some repute was Bartoleme de Aguero (1531–97), professor of surgery at Seville, called by some the Spanish Paré, whose works were published in 1604 under the title *Tesoro de la verdadera cirujia*, and in other editions in 1624 and 1654.

Dionisio Daça Chacon (1510–159?), a surgeon in the Spanish army, serving in many countries and in the immediate service of Charles V., Philip II., Juan of Portugal, Don Carlos, and Don John of Austria, wrote his *Practica y teorica de cirujia* about 1580. This was the first comprehensive work in surgery written in Spanish. He used the cautery for checking hemorrhage in amputations, did not consider gunshot wounds poisonous, and abandoned the use of boiling oil in treating them after 1544, at the suggestion of a certain M. Bartolomeo, probably Maggius. His interesting report on the injury of the head of Don Carlos, in which he opposed Vesalius, who advised the trepan, is given with comments by J. M. Guardia in the *Gazette Méd. de Paris*, 1863, p. 41.

Andreas Alcazar, professor at Salamanca, published in 1575, in folio, his *Chirurgiae, ... libri sex*, and in 1582 his *De vulneribus capitis*.

Juan Fragosa, surgeon to Philip II., published *Erotemas quirurgicos* (Madrid, 1570, 4to), *De la Cirugia, etc.* (Madrid, 1581, fol.), *Tratado de cirugia sacado de la cirugia universal*, a little manual of questions and answers for students (1692), and *Cirujia universal, ... Y mas otros tres tratados . . . . Una summa de proposiciones contraciertos avisos de cirugia . . . . de las declaraciones acerca de diversas heridas y muertos . . . . de los Aphorismos de Hyppocrates tocantes a cirugia* (Alcala, 1592, and several later editions).

Cristobal Montemayor, surgeon of Kings Philip II. and III., wrote *Medicinia y cirugia de vulneribus capitis* (Valladolid, 1613; Saragossa, 1664).

Pedro Gago de Vadillo, a surgeon of Lima, published at Madrid, in 1632, *Discursos de verdadera cirugia y censura de ambar vias, y eleccion de la primera intencion curativa, y unicion de las heridas*, of which a third edition appeared in 1692.

Eighteenth Century.

At the beginning of the eighteenth century the only city in which there were any special opportunities for the study of surgery was Paris. There was no place for the barbers or the barber surgeons in the universities of Europe, and they had no institutions of their own in which any teaching worthy of the name could be obtained. Many of them had learned something in the camp or on the battle-field, which was the great practice school for the surgeons, as it had been for three centuries,

and there were but few surgeons of the time in England, France, or Germany who failed to gain experience therein. Nevertheless, this military experience contributed little to the advancement of surgery. Haeser says that the chief cause of the supremacy of French surgery in the seventeenth and eighteenth centuries was the wars undertaken by Louis XIV. and his successors, and that streams of German blood contributed in some degree to the foundation of the mastership of the French in the domain of surgery. There is a grain of truth in this statement, but it does not explain why the German and the English surgeons, who also saw more than enough of military surgery at this period, did not make the same progress as the French. Army service gives valuable experience to the man who has suitable preliminary training and is well grounded in anatomy, but for the barbers and barber surgeons of the eighteenth century such service increased their knowledge but little. It is true that the surgeons had learned something. They knew that shot-wounds were not poisonous and did not require cauterizing, and a large number of them probably also knew that ordinary wounds not involving the bones really required very little treatment. Nevertheless, they kept on prescribing and using their oils, ointments, plasters, vulnerary drinks, etc., the formulæ for which fill a considerable space in the surgical treatises of the day; and there is one special reason for this which the modern surgeon and historian usually does not fully appreciate. This reason was, that the charges of the surgeons in those times were based upon these applications, and this was also true for the ordinary practitioners of medicine: they compounded and dispensed their own remedies; their charges were made for the remedies and not for the visits; and hence the fees were in proportion to the number of the mixtures, draughts, unguents, etc. which were ordered for a particular case. The surgeons at the beginning of the eighteenth century, as a rule, used styptic powders and compression to check hemorrhage. Those who knew anything about the use of the ligature appear to have been afraid to trust it, and to have preferred the actual cautery. It was supposed to be necessary, or at all events desirable, to include a portion of the surrounding tissues with the artery to be ligated, for fear that the ligature might cut through the coats, and for the same reason the cord was often tied over a small pad instead of being made directly to encircle the vessel. In the army the surgeons necessarily practised medicine, but in civil life they were, as a rule, forbidden to use or prescribe the internal remedies, that being the business of the physician, who claimed exclusive rights in this respect.

At the beginning of the eighteenth century the leading surgeons in Paris were Georges Mareschal (1658–1736), surgeon of the Charité and first surgeon of Louis XIV. in 1703; Jean Méry (1645–1722), first surgeon of the Hôtel Dieu and the deviser of the operation of suprapubic puncture of the bladder; and Pierre Dionis (165?–1718), who had commenced teaching anatomy at the Jardin du Roy in 1673, and in connection with his lessons gave demonstrations of surgical operations on the cadaver. He had many pupils, and his *Cours d'opérations de Chirurgie*, first published at Paris in 1707, went through many editions and was translated into English, Dutch, and German, being a popular manual for fifty years. He advises the ligature of arteries in amputations, but says that at the

Hôtel Dieu the vitriol button is used instead. He advises the Marian operation in lithotomy, but says that he does not believe the high operation to be so dangerous as is supposed, and that he is assured that M. Bonnet has often practised this operation at the Hôtel Dieu with happy success. He tells at length the story of Frère Jacques up to that date, and apparently very fairly, showing the ignorance of the man, but saying that a surgeon who is a good anatomist may succeed by his method; which was true prophecy.

This Frère Jacques—Jacques de Beaulieu (1651–1719)—was an ignorant peasant who for a time was a servant of an Italian Incisor named Palloni. He became a monk, or, as Dionis says, a sort of a monk, and came to Paris in 1697, as he said, to show the surgeons how to perform lithotomy in a particular way. He was successful at first, and acquired great reputation, but soon had many deaths and left Paris, going in 1704 to Holland, where he taught his method to Rau, who improved it into what is generally known as the lateral operation. Frère Jacques himself improved his methods greatly after his visit to Paris, and spent the rest of his life as a wandering lithotomist, chiefly in Austria and Italy.

There is much good reading in Dionis: he does not confine himself to a mere description of the operations, but gives anecdotes which furnish a picture of his times and surroundings.

Gabriel le Clerc, a surgeon of Lille, published at Paris in 1692 a little book called *La chirurgie complète*, being a sort of quiz-compend with questions and answers. This became a popular manual, passing through eighteen editions and translations. He mentions the Hôtel-Dieu method of stopping bleeding arteries by vitriol buttons, and says that it is the custom of the Hôtel Dieu to employ a person to keep on the dressing with the hand for twenty-four hours after the operation.

B. Saviard (1656–1702), surgeon of the Hôtel Dieu, published in 1702 his *Nouveau recueil d'observations chirurgicales*, which was translated into English and published at London in 1740. This is a valuable collection of cases, containing a description of the tourniquet (using that name) as applied at the Hôtel Dieu in 1688 in a case of successful ligation of the femoral for a wound of that vessel. He refers to the pernicious atmosphere of the Hôtel Dieu and its effects on wounds, gives an interesting note on Frère Jacques, describes a case of dermoid cyst of the ovary and one of congenital absence of the penis, and gives details of some remarkable cases of lithotomy. It is a book worth having.

René Jacques Croissant de Garengeot (1688–1759) published his *Traité des operations de chirurgie* in 1720 (2d ed., 3 vols., in 1731). He was one of the best anatomists and surgeons of his time, and introduced many methods in details of operations for nasal polypus, hare-lip, strangulated hernia, etc.

Alexis Littre (1658–1726), whose name remains connected with the form of hernia first described by him, was a surgeon who devoted himself largely to pathological anatomy, and whose papers are contained in the Memoirs of the Academy of Surgery. He first proposed the operation of colotomy in 1710.

Nicolas Andry (1658–1742), dean of the medical faculty of Paris in 1724, is known in the history of surgery by his *L'Orthopédie, ou l'art de*

prévenir et de corriger dans les enfans les difformités du corps (Paris, 1741), being the first work in which the word orthopædia is used. It is a popular treatise on the care of children, and has very little to do with orthopædia as that word is now understood.

The most distinguished surgeon of the first half of the eighteenth century was Jean Louis Petit (1674–1750), who entered the army at the age of eighteen. In 1700 he settled at Paris and commenced giving a private course of lectures in anatomy and surgery. He invented the screw tourniquet, an appliance of almost as much importance as the ligature to the surgeon who has to amputate with unskilled assistance, devised herniotomy without opening the sac, and made an improvement in the circular method of amputation by cutting successively the skin and the muscles, instead of dividing them at one stroke according to the old method. This was carried still further by Desault, who divided the muscles on two levels. To Petit also is due the credit of having first demonstrated the mechanism of the occlusion of arteries in wounds, showing the chief process to be the formation of a clot, a part of which surrounds the end of the vessel and a part of which is a plug occupying the cavity; and of giving the first account of mollities ossium.

After the triumph of the medical faculty over the surgeons and barber surgeons in the middle of the seventeenth century, the College of St. Côme continued to give instruction, although it could not grant degrees, and in 1690 the number of the students was greater than the number of students in medicine, being over seven hundred. It was by no means poor, and in 1691 it began the construction of a new amphitheatre, which was completed in 1694.[1] In it were given lessons on anatomy and surgical operations, and similar teaching was given by a few ambitious young surgeons as a private enterprise. To become a member of St. Côme the aspirant must have been an apprentice for at least six years before he could present himself to perform his "grand chef d'œuvre," which, if successful, would make him a master surgeon. This "grand chef d'œuvre" was a long process of examination. The Washington Library contains a manual of preparation for it, in the form of a neatly-written manuscript, bound in four volumes, 8vo, "par C. Caulay, récu chirurgien juré le 24 juillet, 1737."

François de Lapeyronie (1678–1747) was a surgeon of Montpellier and demonstrator of anatomy in the School of Medicine. He came to Paris in 1714, soon became surgeon of the Charité, and first surgeon of the king in 1736. He was wealthy, and spent his money freely for the benefit of the Royal Academy of Surgery, which was organized in 1731, increasing in fame and prosperity for the next forty years, and through the agency of which, to a considerable extent, Paris became the great surgical centre of the world. J. L. Petit became the first director of the academy, and Sauveur-François Morand (1697–1773) its first secretary. Morand was an ingenious surgeon. He proposed amputation at the hip-joint and ovariotomy, and performed the high operation for stone, but he was an uneducated man, and was unable satisfactorily to perform the duties of secretary of the academy, which post he resigned in 1739. He was succeeded by Antoine Louis (1723–92), to whom the success of the academy and its marked influence on the progress of

[1] Corlieu: *La France Méd.*, 1878, xxv. p. 481.

surgery are to a great extent due. He was professor of physiology, and in 1757 became surgeon of the Charité, but he was not so much an operator or inventor as he was a learned historian, editor, and critic.

An indispensable work for the student of the history of surgery in France at this period is the collection of eulogies pronounced by Louis upon deceased members of the academy, published with notes and appendices by E. F. Dubois in 1859. These so-called *éloges* are judicial, critical, historical essays which are unequalled in surgical biography. At the commencement of his eulogy on Le Cat he remarks that these memoirs will form a part of the history of the Academy to be read in years to come, and that the truth must be told; and in this he was a true prophet. His *Œuvres diverses de chirurgie* were published in 1788.

Of the earlier members of the academy, besides those already named, the most distinguished were Le Dran and Le Cat. Henry François le Dran (1685–1773), the son of a surgeon, was educated in Paris, and became a master in surgery at the age of twenty-two. In 1724 he was appointed one of the four surgeons of the Charité, and established an anatomical school there, and in 1730 published his *Parallèle des différentes manière de tirer la pierre hors de la vessie*, which gave him much reputation. In 1734 he was sent as chief surgeon to the army, and published the result of his observations in 1737 in his *Traité . . . . sur les playes d'armes a feu*, which went through several editions. In 1742 he published a treatise on operative surgery. Le Dran made no great contribution to surgery, but he was a celebrated teacher and had many pupils from Germany, through whom his method became popular in that country.

Claude Nicolas le Cat (1700–68) was a surgeon of Rouen, who became surgeon-in-chief of the Hôtel Dieu of that city as the result of concours in 1729. He won many prizes from the Academy of Surgery in Paris, being specially skilled in "prize-essay writing," became professor of anatomy and surgery in the school established at Rouen in 1736, and attracted many students. He was a voluminous writer, but his papers which relate to lithotomy are the only ones of any special value. His reputation was greater abroad than it was at home.

Other surgical writers of this period are Guillaume Mauquest de la Motte (1655–1737), whose *Traité complet de chirurgie* (3 vols., Paris, 1722) was a very popular text-book; Georges de la Faye (1699–1781), whose *Principes de chirurgie* (Paris, 1739), an elementary handbook, passed through many editions and translations; and Elie Col de Villars (1675–1747), whose *Cours de chirurgie* appeared in 1738.

Dominique Anel (1678–1725 ?), a native of Toulouse, was a pupil of J. L. Petit, a surgeon in the French and Austrian armies, and a wanderer over Europe. In 1710 he ligated the brachial artery of a priest in Rome for traumatic aneurism, and this is claimed as a triumph of French surgery preceding the method of John Hunter. In fact, it was the operation performed and described long before by Guillemeau. In Genoa, in 1712, he devised his operation for lachrymal fistula and the syringe which still bears his name. In 1716 he was practising as an eye surgeon in Paris.

George Arnaud de Ronsil, a French surgeon, went to London prior to 1748, and remained there until his death in 1774. His *Dissertation*

on Hernia (London, 1748) was a paper of much importance. His *Mémoires de chirurgie* (London, 1762, 2 vols. 4to) contains matter of permanent value, and a curious paper, "Inconvéniens des Descentes particuliers aux Prêtres de l'Église Romaine," with reference to Leviticus xxi. 20. In 1732 he excised the cæcum and a part of the colon and ileum in a case of hernia.

Jean Baseilhac (1703–81), better known as Frère Côme, was the son of a surgeon and was educated as such. In 1729 he became a monk, but continued to practise surgery among the poor, and invented the lithotome cache. He published anonymously in 1751 an account of his operation, and in 1779 published a paper on the high operation. He was a skilful surgeon, and obtained greater success with his instrument than any other person has been able to do.

Pierre Brasdor (1721–97) was professor of anatomy and operative surgery in the College of Surgeons of Paris, and contributed to the Memoirs of the Academy of Surgery. His name is remembered in connection with his suggestion to treat certain aneurisms by ligation of the artery on the distal side of the tumor; which was first done by Wardrop.

Francis G. Levacher published in the Memoirs of the Academy of Surgery, in 1769, a paper on gunshot wounds, in which he, for the first time, showed that what were supposed to be the effects of the wind of a ball were really due to the ball itself.

Hugues Ravaton, a surgeon of the French army, published in 1750 the best treatise on gunshot wounds which had yet appeared. His *Chirurgie d'armée* was issued in 1767, and his *Pratique moderne de la chirurgie* in 1770. He was the first to practise amputation by the double-flap method.

Jean Joseph Sue (1710–92), son of a Paris surgeon, and often mentioned as "Sue le jeune," was a teacher of anatomy, and in 1761 one of the surgeons of the Charité. He published *Éléments de chirurgie* (Paris, 1755), *Traité des bandages* (Paris, 1761), and *Dictionnaire positif de chirurgie* (Paris, 1779).

Jean Louis Belloq (1730–1807), a professor of anatomy in Paris, devised a number of instruments, among which was the canula for plugging the posterior nares still known by his name.

In the latter part of the century the leading surgeon in Paris was Pierre Joseph Desault (1744–95), who became surgeon of the Hôtel Dieu in 1788, and soon had a crowd of students following his public clinic, the like of which had never been seen before. He was a pupil of Louis and of Morand, and surgeon of the Charité in 1782. He was the first teacher of surgical anatomy in the modern sense of the term, made many improvements in the treatment of fractures, and contributed largely to the perfecting of surgical technique. He wrote almost nothing, but his pupil, Bichat, gave the substance of his teachings in the *Œuvres chirurgicales* (3 vols., 1798–1803). In 1792, Desault was arrested on the charge of having poisoned the wounds of some of the revolutionists who had been brought to the Hôtel Dieu. It was then but a step from the prison to the scaffold, and his pupils formed themselves into a deputation to defend him before the tribunal, their spokesman being Jean Pierre Maunoir, a young Swiss, afterward a celebrated surgeon in Geneva, whose pleadings prevailed and Desault was released.

The Hôtel Dieu of Paris was the "oldest, largest, richest, and worst hospital in Europe." In the latter part of the eighteenth century it contained over twelve hundred beds, and sometimes over three thousand patients, having four or five in one bed. The first distinct mention of surgeons in the Hôtel Dieu occurs in the records of the year 1539, in which it is ordered that the surgeon Jocot la Normand shall be retained to serve as surgeon in the Hôtel Dieu in place of George Barbas at a salary of about one hundred and eighty francs. By declaration of the managers in 1605 the surgeon must call a physician to see all the operations of surgery which he shall make within the Hôtel Dieu.

In 1654, Jacques Petit, master of surgery in Paris, was named surgeon of the Hôtel Dieu. This was an invasion, for up to that time the surgeons had been chosen from among the surgeons of the hospital. This Jacques Petit gave a course of anatomy to the pupils in the hospital, commenced the collection of instruments of surgery, and gave a sort of course of surgery at the bedside. This was the beginning of clinical surgery in this hospital and in France. He entered the hôtel at the age of thirteen, studied surgery there, and filled the place of surgeon-in-chief until 1705. The story was that he was more than sixty years in the house without putting his foot outside of it.

He was succeeded in 1705 by Méry, one of the most celebrated of the surgeons of this period. Méry was succeeded in 1722 by Thibault, he by Pierre Boudou, and he by Moreau, who was succeeded by Desault in 1786. Desault was succeeded by Pelletan in 1795.

The records of the Hôtel Dieu which escaped the fire of 1871 have been published by the Bureau of Public Assistance under the title *Collection de documents pour servir à l'histoire des hôpitaux de Paris* (Paris, 1881–87). In the second of these volumes, published in 1883, are given the deliberations of the governors of this hospital for the years 1768 to 1791, at the time when the hospital was badly overcrowded and complaints were being made by the surgeons of the management of the institution. Among other things, it contains a copy of the memoir of the Sisters in charge of the hospital, who in 1789 made a complaint against Desault to the effect that he was bringing pupils from the outside into the amphitheatre, which should be reserved for the pupils of the hospital alone, that the dressing of wounds was being interfered with, and that from two to three hundred strangers were admitted every day to hear his lectures. To this there is a long reply by Desault, showing that the complaints were in part ill founded, and urging that it is contrary to the public good to confine clinical instruction to the pupils resident in the house. The matter was investigated and the decision was given in favor of Desault. A very interesting description of the old Hôtel Dieu, showing the arrangement and character of the beds and furniture, overcrowding, etc., is given by Dr. J. B. Tenon (1724–1816) in his *Mémoires sur les hôpitaux de Paris* (1788, 4to).

François Chopart (1743–95) became professor in 1771, and in 1780 published, with Desault, the *Traité des maladies chirurgicales et des opérations, etc.*, which contains some of Desault's views, but which was wholly written by Chopart. His name remains connected with a form of partial amputation of the foot first described in 1792.

Raphael Bienvenu Sabatier (1732–1811) was a pupil of Petit, and

became professor of anatomy in the Royal College of Surgery. His principal work was his *De la médecine opératoire* (3 vols., 1798–1810).

J. Fr. Deschamps (1740–1824), a pupil of Moreau and surgeon of the Charité, brought the Hunterian operation for aneurism into notice in France, and published an interesting historical treatise on lithotomy in 1796.

François Quesnay (1694–1774), secretary of the Academy of Surgery, wrote a work on the history of surgery in France which is full of errors.

Antoine Portal (1742–1832), professor of anatomy in the Royal College of France, is the author of *Histoire de l' anatomie et de la chirurgie, etc.* (7 vols., Paris, 1770–73), which is a useful book of reference.

Jean René Sigault studied surgery at Paris, and was received as master in the school in 1770. In 1768 he presented a memoir to the Royal Academy of Surgery proposing to substitute the section of the symphysis of the pubis for the Cæsarian section. The proposal was not approved, but he performed the operation in 1777 with success, and, as he had become a doctor of the Faculty of Medicine, his new operation was received with great enthusiasm by the members of the faculty. He published his *Mémoire [sur la section de la symphyse des os pubis, pratiquée sur la femme Souchot], lu aux assemblées du 3 et du 6 décembre*, 1777 (16 pp. 4to, Paris, 1777), and *Discours sur les avantages de la section de la symphyse* (8vo, Paris, 1778).

Georg Fischer, in his *Chirurgie vor 100 Jahren* (Leipzig, 1876), has given a graphic picture of the condition of surgery and surgeons in Germany in the eighteenth century. The great mass of the people could only obtain surgical treatment from local barbers or from wandering charlatans. The barber's apprentice could hardly write or even read German. He learned how to shave, and then went from house to house to serve his master's clients. He was also taught how to sharpen knives, spread blisters, and make lint. He performed the most menial duties in the house, and occasionally one of the unhappy youths ran away and was duly advertised as a sort of runaway slave. The people were grossly ignorant and intensely superstitious, believing in charms and magic; and the supply of this kind of medicine was not wanting. The cutters for stone and hernia, the cataract-operators, the bone-setters, and the travelling charlatans flourished everywhere, and the repeated edicts and ordinances issued by kings, nobles, and city authorities to remove the complaints made by the physicians and to settle the difficulties merely prove the condition of the times and seem to have had very little effect. Even the executioners competed with the surgeons. They were supposed to have special dealings with the powers of evil, and in consequence to have special knowledge of the means of curing diseases considered to be due to witchcraft. A part of their business was to dislocate joints by the rack or to break bones upon the wheel, and hence it was supposed that they had special skill in the repair of fractures or of dislocations.

The practice of medicine was forbidden to the executioners in Prussia, but in the year 1744 Frederick the Great granted to them permission to treat fractures, wounds, and ulcers, and when the Berlin surgeons complained of this he issued an order saying that he had not permitted all executioners, but only the skilful ones, to practise, and if the surgeons

are as skilful as they pretend to be, every one will rather trust them than go to an executioner; but if the surgeons are ignoramuses, the public must not suffer, but must submit to be treated by the executioner rather than to remain lame and crippled.

In Germany the first surgeon of importance in the eighteenth century was Lorenz Heister (1683–1758), a native of Frankfort-on-the-Main. After studying medicine for four years at Giessen and other German universities, he went to Amsterdam in 1706 to study anatomy and surgery under Ruysch and Rau, and took his degree at Leyden in 1708. He gained experience in the army hospitals at Brabant and Flanders, made a tour into Great Britain, and in 1710 became professor of anatomy and surgery in the University of Altdorf. Here he lectured in Latin, but found the students and young surgeons so ignorant that he determined to print his system of surgery first in German, which he did at Nuremberg in 1718, as he states in his preface to later editions, and as given in bibliographies. I have, however, never been able to see a copy of this date, the earliest edition in the Washington Library having the imprint "Nürnberg, bey Johann Hoffmanns seel. Erben, im Jahr mdccxix." The work was a very popular one, and was translated into Latin, and thence into English under the title of *A general system of surgery* (1743; 7th ed. 1759), forming a thick quarto which is still excellent reading for a surgeon. Sharp says, in the preface of his *Critical enquiry* (1750), "Heister's Surgery is in every body's hands, and the character of Heister is so well established in England, that any account of that work is needless."

The other German university professors of surgery in the first half of the eighteenth century who are worthy of note are Haller, Platner, Mauchart, and Bass.

Albrecht von Haller (1708–77), a native of Bern, a pupil of Boerhaave, and one of the greatest physicians who ever lived, was professor of anatomy and surgery in the University of Göttingen from 1736 to 1753, and exerted a powerful influence on the development of anatomy, physiology, and surgery through his writings and his pupils, who came to him from all parts of Europe. He never performed a surgical operation on the living body, and his teaching in surgery was therefore purely theoretical. His *Bibliotheca chirurgica* (2 vols., Berne, 1774–75) is the most valuable work on the history and literature of surgery that has ever been published. He placed on a firm foundation the experimental method in dealing with surgical problems which was a little later so successfully employed by John Hunter, and which has contributed so much to our knowledge during the present century.

Johann Zacharias Platner (1694–1747) was professor of anatomy and surgery in the University of Leipzig from 1724 until his death. His *Institutiones chirurgiæ rationales tum medicæ, etc.* (Leipzig, 1745) passed through several editions and was translated into German and Dutch.

Burchard David Mauchart (1696–1751) studied at Tübingen, Altdorf, and Paris, and became professor of anatomy and surgery in the University of Tübingen in 1726. He devoted himself chiefly to the anatomy and diseases of the eye, and left no systematic treatise, but published a number of dissertations, which were collected after his death and published in three volumes (Tübingen, 1783–86).

Heinrich Bass (1670–1754) became professor of surgery in the University of Halle in 1718, and in 1720 published his *Gründlicher Bericht von Bandagen*, which was a favorite text-book for the next fifty years.

The great difficulty experienced by the government in providing competent surgeons for the troops led to the organization in 1724, at Berlin, of a medico-chirurgical college, the Friedrich Wilhelms Institut. In 1727 the Charité Hospital was founded by King Friedrich Wilhelm I., mainly to furnish clinical instruction to the students of this college. The supply, however, was not equal to the demand, for Frederick II. in his Silesian campaigns found an urgent need for skilled surgeons, and sent some of his young officers to Paris and Strasburg to perfect their education and to fit themselves to instruct others, and in 1743 he engaged twelve French surgeons and assistants for the benefit of his troops. The results were not altogether satisfactory, because surgery was generally considered to be distinct from and inferior to medicine; those who were destined to it were usually apprenticed to barbers, and the young surgeons were, as a rule, men of an inferior class and of little education. Finally, in 1795, as the result of urgent appeals from Görcke, the surgeon-general of the Prussian army, the college was reorganized under the name of the Pépinière, and was devoted exclusively to the education of medical officers for the army, retaining a special connection with the Charité.[1] An institution similar to the Pépinière, and for the same purpose, was organized in Dresden in 1748 as the "Collegium Medico-chirurgicum."[2]

The three German military surgeons of chief repute during this period were Schmucker, Bilguer, and Theden.

Johann Lebrecht Schmucker (1712–86) was educated at the Pépinière, and sent to Paris for two years by the king to study under Le Dran. He became the surgeon-general of the army, and published the results of his experience in his *Chirurgische Wahrnehmungen* (2 parts, 1774) and *Vermischte chirurgische Schriften* (3 vols., Berlin, 1776–82). His observations on wounds of the head and trephining and on amputations are the most valuable of his writings.

Joh. Ulrich Bilguer (1720–96) studied at Strasburg and Paris, and entered the army in 1741. In 1757 he became the second surgeon-general. In 1761 he published his *De membrorum amputatione rarissime administranda, etc.*, which passed through numerous editions. In this he opposed the excessive tendency to amputation of his time, which was rather encouraged by Schmucker, and went to the other extreme. His *Chirurgische Wahrnehmungen* (Berlin, 1763; translated into English, London, 1764) is his most important work.

Joh. Christ. Anton Theden (1714–97) was educated as a barber surgeon, entered the army in 1737, and became third surgeon-general in 1758 and first surgeon-general in 1786. His *Neue Bemerkungen und Erfahrungen zur Bereicherung der Wundarzneykunst und Medicin* (published in 1771 and later editions, also in a French translation) contains accounts of some remarkable cases and surgical methods—so remarkable,

[1] For details consult *Das Königl. preus. Med.-chir. Friedrich Wilhelms Institut*, von D. E. Preuss, Berlin, 1819, 8vo.

[2] For the history of this see *Das Königlich sächsische Collegium Medico-chirurgicum*, von Dr. H. Frölich, im Der Feldarzt, Wien, 1877, No. 9.

in fact, as to excite some suspicion. For the ligature of arteries in amputation he substituted graduated compresses and the use of a certain wonderful lotion, the "arquebusade," composed of vinegar, alcohol, sugar, and dilute sulphuric acid, with some salt of lead. He strongly advocated methodical bandaging of the extremities, claiming by its use to have cured aneurism, varix, etc.[1]

In the last half of the century the two chief German surgeons were Von Siebold and Richter.

Carl Casper von Siebold (1736–1807), the son and apprentice of a surgeon, served for a time in French hospitals, and studied in Paris under Morand and in London under Pott and Bromfield. In 1769 he became professor of anatomy, surgery, and obstetrics at Würzburg, and soon acquired great reputation as an operator and clinical teacher. He was succeeded as professor and as surgeon of the Julian Hospital by his son, Joh. Barth. Siebold (1774–1814), who founded a journal called *Chiron*, devoted to surgery.

August Gottlieb Richter (1742–1812) became professor of surgery in Göttingen in 1766, and gave a new impulse to the study of that art in Germany, being the first to place it on a scientific basis. He was the best teacher of surgery in Germany in his day, had travelled extensively, was familiar with the good work then going on in France and England, and was an excellent writer. His *Abhandlung von den Brüchen* (1777–79) was the best book on hernia up to that date, and is still a classic. His history of surgery, *Anfangsgründe den Wundarzneykunst* (7 vols., 1782–1804), is a model in arrangement and style, but is not complete. His journal, the *Chirurgische Bibliothek* (15 vols., 1771–96), did more to develop surgery in Germany than any previous agency.

In Austria there is little worthy of note in the history of surgery until the latter part of the century. Gerard van Swieten (1700–72), a pupil and friend of Boerhaave, went to Vienna in 1745 and introduced clinical instruction, but the only surgeon of repute there in 1780 was Ferdinand von Leber, who is principally known by the investigation which he made upon the use of torture in jurisprudence. In 1785 the Military Medico-Chirurgical Akademie was founded by the emperor Joseph II. and placed under the direction of Brambilla, the object being the same as that of the Berlin Pépinière. It was connected with a hospital of twelve hundred beds, and received one hundred pupils, of whom twenty-four were residents in the house. The course of study was two years, and after passing the examination the student received the degree of doctor in surgery and the first vacant position in a regiment.

Giovanni Alessandro Brambilla (1728–1800) was an Italian who had studied in Pavia, and became a surgeon in the Austrian army and a special favorite of the emperor. He prepared the *Instruktion für die Professoren der k. k. chirurgischen Militärakademie* (Wien, 1784, 4to) and the *Instruktion für das k. k. Militärspital zu Wien* (Wien, 1784, 4to), which are curiosities in literature. The subjects and the order of the subjects to be taught are scheduled for each professor. He also published a large atlas of engravings of surgical instruments and a history of discoveries made by Italian anatomists and physicians, and exerted a power-

[1] For details as to the military surgery of these times see *Die Kriegs-Chirurgie der letzen 150 Jahre in Preussen*, von Dr. E. Gurlt, Berlin, 1875.

ful influence upon the progress of surgical education, although he made no special improvements himself. A protégé of Brambilla was Joh. Nepomuk Hunczovsky (1752–98), a barber's apprentice, who in 1781 was appointed professor in the military medical school at Gumpendorf, and published a compendium of surgical operations in 1785, of which there were three later editions.

At the commencement of the eighteenth century Holland was a great centre of medical instruction: Boerhaave had introduced clinical teaching at Leyden, where Bidloo was also lecturing; Ruysch and Rau were teaching in Amsterdam, and all who desired a complete education in surgery visited these schools.

Frederik Ruysch (1638–1731) commenced teaching anatomy in Leyden in 1666, and became famous for the perfection of his anatomical preparations, and especially for his injected preparations. His collection was purchased by the czar, Peter the Great, but a part of it was lost before it reached St. Petersburg. His numerous essays relate chiefly to anatomy, but contain some surgical observations.

Joh. Jac. Rau (1668–1719), a native of Baden and an apprentice of a barber surgeon in Strasburg, studied at Leyden and Paris and settled in Amsterdam, where he gave lessons in anatomy and surgery, to the great dissatisfaction of Ruysch. Having learned from Frère Jacques his method, he improved upon it and acquired great fame as a lithotomist, but kept secret the details of his method, which was probably the lateral operation. He wrote nothing of importance, but had many distinguished pupils.

To this period belong Abram Titsingh (1685–?) of Amsterdam, city surgeon, surgeon of the admiralty, and master of the Surgeons' Guild, who wrote works on lithotomy, spina bifida, venereal diseases, etc. which were valuable in their day; Joh. Daniel Schlichting (1703–?), a lecturer on anatomy and surgery in Amsterdam in the middle of the century, said to have been the first to perform neurotomy for neuralgia of the fifth pair; Jos. Monnikhof (1707–87), appointed herniotomist of Amsterdam in 1752, who in 1775 published statistics of one thousand cases of hernia, the first collection of this kind which had appeared; and Charles Faudacq (1691–175?) of Namur, who studied in Paris under Petit, and published *Réflexions sur les playes, etc.* (Namur, 1735), and *Nouveau traité des plaies d'armes-à-feu* (Namur, 1746).

In Ghent the leading surgeon was Joh. Palfyn (1650–1730), educated in Paris, master of the Barber-Surgeons' Company in Ghent in 1698, and professor of anatomy and surgery in 1708. He is best known by his *Anatomie Chirurgicale*, first published at Paris in 1726, and the first treatise with the title of "Surgical Anatomy."

In the last half of the century the most celebrated teacher in Holland was Peter Camper (1722–89), a native of Leyden, who became professor of anatomy and surgery in Amsterdam in 1755 and professor in Gröningen in 1763. He was one of the most learned men of his time, and a voluminous writer on anatomy, pathology, and medical jurisprudence. His treatise on calculus (1782), his dissertation on fracture of the patella and olecranon (1789), and his *Icones herniarum*, published after his death by Soemmering, are valuable contributions to surgical literature.

Among the Italian surgeons of the eighteenth century the best

known are Benevoli, the two Nannonis, Lancisi, Valsalva, Tacconi, and Bertrandi.

Antonio Benevoli (1685–1756), a surgeon of Florence, discovered in 1722 that cataract is an opacity of the lens, and published his *Discorsi di chirurgia* in 1750. He discovered the principle of treating stricture of the urethra by dilatation.

Angelo Nannoni (1715–90) studied in Florence under Benevoli, and afterward in Paris and Rouen, and became chief surgeon of the hospital Santa Maria Nuova in Florence, attaining great reputation. His principal works are *Trattato chirurgico sopra la semplicità del medicare i mali d'attenenza della chirurgia* (1770) and *Memorie sopra alcuni casi rari di chirurgia* (1776).

Lorenzo Nannoni (1749–1812), son of Angelo, studied under his father, and became surgeon to the Hospital of the Innocents in Florence, where he gave clinical teaching. His principal work is *Trattato delle materie chirurgiche, etc.* (2d ed. 3 vols., 1793–94).

Giovanni Maria Lancisi (1654–1720), professor of anatomy at Rome and physician to Popes Innocent XI. and XII., is best known as an anatomist, but in his *De motu cordis et aneurysmatibus*, first published after his death in 1728, and in four later editions, he first clearly pointed out the difference between true and false aneurism.

Antonio Maria Valsalva (1666–1723) studied at Bologna, graduating in 1687, and became professor of anatomy in the university and surgeon to the Hospital of the Incurables in 1697. His chief work was *De aure humana tractatus* (1705).

Gaetano Tacconi (1689–1782), a native of Bologna, succeeded Valsalva as professor, and was surgeon to the hospital Santa Maria. He wrote *Notizia della ferita e della cura chirurgica seguita, etc.* (1738), and *De raris quibusdam herniis, etc.* (1751).

Giovanni Ambrogio Bertrandi (1723–65), son of a surgeon, studied at Turin and Paris, and in 1758 succeeded Lotteri as professor of surgery at Turin. His principal work is his *Trattato delle operazioni di chirurgia* (2 vols., 1763), which passed through several editions and was translated into French and German. His collected works, *Opere anatomiche e cerusiche*, were published after his death in fourteen volumes (1786–1802).

At the beginning of the eighteenth century there were few educated surgeons in London, and still fewer in the provincial towns; there was no special instruction in surgery to be obtained except through apprenticeship; and the facilities for studying anatomy were extremely limited.[1] When the monasteries were broken up by Henry VIII. the hospitals, which had previously belonged to the Church, became the property of the government. St. Bartholomew's was refounded in 1544, and placed under the superintendence of Thomas Vicary. This hospital had one physician and three surgeons, and these allowed their pupils and apprentices to attend and witness the practice. In 1662 there is mention of the presence of such students, but no formal system of lectures or teaching seems to have existed until after 1734, when leave was granted for

[1] See *The present state of chyrurgery*, by T. D. (London, 1703), in which, among other charlatans, reference is made to "The Unborn Doctor who cut off a vast number of women's breasts without loss of blood."

any of the surgeons or assistant surgeons to read lectures in anatomy in the dissecting-room of the hospital, and in 1763 a course of lectures on surgery was commenced by Percival Pott.

At St. Thomas's Hospital the first mention of an apprentice in the books is in 1561. The Barber Surgeons' Company was dissatisfied with the teaching in St. Bartholomew's and St. Thomas's hospitals, as it was losing money thereby, and in 1695 it made a special investigation into the complaints as to the manner of teaching in these hospitals, the surgeons to which declared that they had never taken an apprentice for a less term than seven years, but that some of the apprentices of other surgeons were allowed at times to witness their practice. In 1702 the governors of St. Thomas's Hospital took the matter of teaching into their own hands, and passed a law forbidding pupils or surgeons to dissect without permission of the treasurer. In 1703 it was resolved that no surgeon should have more than three "Cubbs;" in 1758 this term was altered to that of "Dressers." Lectures on anatomy and surgery began with Cheselden about 1720, and the Anatomical School may be said to have been fairly established about 1780.[1]

At the London Hospital the entry of the first student was in 1742, two years after the commencement of the hospital, and the Medical School was fully organized upon the model of the Edinburgh Faculty in 1785.

In the Orders of St. Bartholomew, dated 1633, it is directed "that no chirurgeon, or his man, doe trepan the head, dismember, or perform any great oper'con, but with the approbation or by the direction of the doctor." Special operators were appointed to cut for the stone at the hospitals, a Mr. Mullins doing this for St. Bartholomew's and St. Thomas's.

The Medical School of Guy's Hospital dates from 1769, in which year a resolution was passed by the governors that all surgeons of the hospital should occasionally give lectures to the pupils. It is also noted: "No persons are to be entertained as pupils but such as have served five years to a regular Surgeon or Apothecary." At this time the schools of Guy's and of St. Thomas's were united, the surgical lectures being given at St. Thomas's and the medical at Guy's, and the two were known as the "United Hospitals."[2]

The ill-assorted union of surgeons and barbers formed by the act of 1540 was by no means harmonious, but the surgeons were unable to get rid of the barbers until 1745, when they agreed with Mr. Ranby, serjeant surgeon to the king, that he should procure the act of Parliament desired, and that in return he should be made a member and be elected as master. The act of 1745, incorporating the "Masters, Governors, and Commonalty of the Art and Science of Surgeons of London," provided that it should be governed by a "court of assistants, composed of twenty-one members, whose office was for life, and who filled their own vacancies by election from the freemen of the company." Ten of this court of assistants were to be "examiners," whose office was also for life, and it was a penal offence for any one to practise surgery in London or within seven miles of the same without having been duly examined and licensed,

[1] See Prospectus, 1877–78, p. 11.

[2] See *A Biographical History of Guy's Hospital*, by S. Wilks and G. T. Bettany (London, 1892).

except that the rights of members of the College of Physicians to do so were not to be interfered with. The surgeons on their separation from the barbers took nothing with them except the Arris and Gale bequests; the hall, library, and plate remained with the barbers, and the new company had to provide a building for itself.

The condition of the company in 1790, as stated by Mr. Gunning, the master of the company, in his address at the close of his term of office, was as follows: "You have a theatre for your lectures, a room for a Library, a committee-room for your Court, a large room for the reception of your committees, together with the necessary accommodation for your Clerk. . . . . Your theatre is without lectures, your library room without books is converted into an office for your clerk, and your committee room is become his parlour, and is not always used even in your common business, and when it is thus made use of it is seldom in a fit and proper state." The next thing that appears in its history is a charter by George III., dated 1800, for consolidating the Royal College of Surgeons of London, in the preamble of which it is stated that "we are informed that the said Corporation of Masters, Governors, and Commonalty of the Art and Science of Surgery of London hath become and is now dissolved." This charter of 1800 simply reiterates the act of 1745.

Turning now to Scotland, we find that, in 1694, Dr. Archibald Pitcairn returned to Edinburgh from Leyden and endeavored to establish a medical school, which he intended, if possible, should surpass that of Leyden; and his first step was to induce a surgeon named Monteith to apply to the town council for a grant of dead bodies. As soon as the other surgeons heard of this, they also applied for the same privilege. The privilege granted to the surgeons had a clause to the effect "that the petitioners shall before the term Michaelmas, 1697, build, repair, and have in readiness one anatomical theatre, where they shall once a year (a subject offering) have one public anatomical dissection, as much as can be shown upon one body, and if the failzie, this presents to be void and null." This condition was complied with, and as the grant required that the body should be buried within ten days, the surgeons selected ten of their number, termed "operators," each of whom lectured one day on certain specified parts. In 1705 this system was changed, and one surgeon performed the duty, while the town council made this same surgeon professor of anatomy in the university. This was the commencement of the Medical School, although it was not until 1726 that it was fully formed through the influence of John Monro, an army surgeon who had settled in Edinburgh in 1700.

The leading surgeon in England in the first half of the eighteenth century was William Cheselden (1688–1752), a pupil of William Cowper, who began to lecture on anatomy in 1711 in his own house, and continued his teaching afterward at St. Thomas's Hospital, to which he was appointed assistant surgeon in 1718 and surgeon in 1719. In 1723 he published his *Treatise on the high operation for the stone*. Soon after he gave up this and perfected his "lateral operation for the stone," an improvement on the method of Frère Jacques and Rau, which soon became famous. He published a paper in the *Philosophical Transactions* on the formation of artificial pupil, which operation he was the first to

perform. In 1733 he became surgeon to St. George's Hospital at its foundation, retired from St. Thomas's in 1738, and was one of the last wardens of the Barber Surgeons' Company immediately before the separation of the surgeons and barbers, which took place in 1744–45.

His pupil, Samuel Sharp (1700–78), was elected surgeon to Guy's Hospital in 1733. His *Treatise on the operations of surgery* (London, 1739; 10th ed., 1782) and his *Critical inquiry into the present state of surgery* (London, 1750 and 1761, and translated into French, Spanish, and German) were celebrated in their day, and the *Critical inquiry* is still a most interesting book to the surgeon. He devised the cylindrical form of the crown of the trephine at present used, and contributed to the knowledge of the anatomy of hernia.

William Bromfield (1712–92), surgeon to St. George's Hospital and surgeon to the king, published his *Chirurgical observations and cases*, in two volumes, in 1773. These contain a number of valuable improvements in surgical methods, particularly as to bilateral lithotomy and the compression of the subclavian artery above the clavicle on the first rib. He also clearly points out the proper manner of ligating the artery in amputations, using the tenaculum to draw out the vessel, so that the nerve and other tissues should not be included, but he used a flat ligature. That he was a cool operator is shown in a case of lithotomy which he reports in the second volume at page 266, in which the intestines protruded into the bladder, and in which he first extracted three stones and then returned the intestines, with result of a perfect cure.

William Beckett (1684–1738), a London surgeon, wrote *Practical surgery illustrated and improved: being chirurgical observations . . . . made at St. Thomas's Hospital* (London, 1740, 8vo), also *A collection of chirurgical tracts* (London, 1740, 8vo), including a paper on new discoveries relating to the cure of cancers, published by him in 1711.

Benjamin Gooch, a surgeon of the Norfolk and Norwich Hospital in 1771, published a volume of *Cases and practical remarks in surgery* (London, 1758), and a collective edition of his works appeared in three volumes (London, 1792). He taught that in case of a wound of an artery ligatures must be applied both above and below the wound.

John Douglas (?–1743) was a Scotch surgeon who gave private lectures on surgery and anatomy in London about 1720, and in the same year published an account of the performance of the high operation for the stone under the title of *Lithotomia Douglassiana*. He was conceited and quarrelsome, and published two abusive pamphlets on Cheselden, by whom he was completely overshadowed.

His brother, James Douglas (1675–1742), was a physician who settled in London about 1700, and was a distinguished anatomist and obstetrician. He published a *Description of the peritoneum* (London, 1730, 4to), in which he described the fold of the peritoneum which is still known by his name.

To the first half of this century belongs one of the greatest itinerant quacks known to history—viz. John Taylor (1708–67), who styled himself "Chevalier, ophthalmiater pontifical, imperial, and royal." He was born in Norwich, and in 1727 published a pamphlet on the mechanism of the eye and on cataract. This he dedicated to Cheselden, from whom he acknowledges that he had learned all that he knew about the matter, and,

while the work was boastful, yet it was not more so than some other publications of that day. Soon after this period he appears to have given up all idea of respectable practice, and travelled far and wide over Europe, advertising himself extensively in every place that he came to, and publishing for the same purpose a large number of pamphlets referring to his wonderful cures. His autobiography, published in three volumes (London, 1762), is one of the curiosities of literature.

The principal English surgeon in the middle of the century was Percival Pott (1713–88), who became assistant surgeon of St. Bartholomew's Hospital in 1745 and surgeon in 1749. His contributions to surgery were numerous and important, especially those on hernia, injuries to the head, hydrocele, and the disease of the spine still known by his name as "Pott's disease." His *Treatise on ruptures* was published in 1756, his *Practical remarks on the hydrocele*, in 1762, and his *Remarks on that kind of palsy of the lower limbs which is frequently found to accompany a curvature of the spine*, in 1779. His *Chirurgical works* appeared in 1771, and there were four later editions, besides German, French, and Italian translations.

Alexander Monro (1697–1767), a pupil of Cheselden and of Boerhaave, became the first professor of anatomy in the University of Edinburgh in 1725; he also lectured on surgery and made great use of comparative anatomy. He founded the Royal Infirmary and gave clinical lectures on surgery, and was one of the best surgeons of his time. His writings relate chiefly to anatomy, but he also wrote important papers on aneurism, cataract, hernia, etc. He first tried to cure hydrocele by the injection of wine. His son, Alexander Monro [secundus] (1733–1817), succeeded him as professor of surgery, and held the chair until 1810, when he gave it over to his son of the same name, Alexander Monro [tertius] (1773–1859), who resigned in 1846, the professorship having thus been held by the three Monros for one hundred and twenty-one years. Although the chair was thus, after a fashion, hereditary, the talent did not descend to the third generation.

The next name to be mentioned is that of a man whose works mark an epoch in the development of surgery—John Hunter (1728–93), the youngest son of a Scotch farmer. His brother William, ten years older than himself, having received an excellent education according to the pattern of that time, settled in London and began to lecture on anatomy and surgery in 1746. In 1748, John Hunter, a rough, ignorant youth, decidedly addicted to low company and amusements, and not having shown the slightest taste for study, joined his brother, and was employed by him as an assistant in the dissecting-room which he had just established. He soon showed that he had found his proper field of activity, and after one year's experience was able to take charge of the pupils and to direct their work. William Hunter was a good classical scholar and a cultivated and polished man of the world, being in all these respects a complete contrast to his brother, who decided in favor of surgery as a career, and studied under Cheselden and Percival Pott.

The brothers entered into partnership in 1754, John devoting himself mainly to anatomy and to physiological experimentation. He also began to deliver lectures, but he was by no means attractive as either a writer or a speaker, and in the latter capacity his audience never

amounted to twenty persons. In 1761 he joined the army, going to the Spanish Peninsula, and remained with it until 1763, during which time he collected the observations contained in his treatise on gunshot wounds. On his return he began to teach anatomy and surgery to private pupils or apprentices, in which undertaking he was aided by his election as surgeon to St. George's Hospital in 1768. The remainder of his life was spent in this work, in investigations, and in the formation of the splendid museum which is now under the charge of the Royal College of Surgeons of London.

The name of John Hunter is familiar to all surgeons mainly through his recommendation that in cases of aneurism due to disease of the artery the artery should be tied in the sound parts between the aneurism and the heart; and aside from this and his great museum, very few persons, except those who have prepared Hunterian orations or studied them, could probably state with any clearness what it was that he did to acquire the reputation which he possesses. His work on comparative anatomy was the result of the dissection of over five hundred species of animals, in the course of which he made innumerable discoveries and anticipated many comparatively recent observers; and in comparative physiology it was even greater, being so far in advance of his times that it was not comprehended.

The treatise on *Blood, Inflammation, and Gunshot Wounds* is usually considered Hunter's greatest work and as embodying the results of the best part of his researches. This work was completed and given to the press during the last year of Hunter's life, and was not published until 1794.

The merit of Hunter's operation for aneurism does not, as Guthrie remarks, lie in the operative process, but in the principles upon which it is founded. The dangers arising from the application of the method of Antyllus to aneurisms produced by disease of the artery were in part due to the danger from hemorrhage when the artery, in a state of disease, is ligated, and in part to the suppuration and ulceration which followed the opening of the sac. But Hunter, reasoning upon experiments made by him in removing portions of the coat of arteries, and also upon the results which he had observed with regard to the establishment of a collateral circulation in cases where an artery had been obstructed, said: "If the artery, however, cannot be tied above the aneurism in the operation, where can it be tied if the limb be amputated? Why not tie it up higher in the sound parts, where it is tied in amputation, and preserve the limb?"

He first performed this operation in 1785, placing four ligatures on the artery with various degrees of tightness. The patient was cured of the aneurism, but died of other complications fifteen months afterward. In the second operation he applied only one ligature. Hunter probably was not aware of the full scope and value of his suggestion. He considered that the arteries which would admit of the operation were the carotids above the sternum, any of the branches of the external carotids, the subclavian after having passed the scaleni muscles, and the crural after having passed Poupart's ligament and given off the large muscular artery. He did not think the subclavian should be tied in axillary aneurism, because he would doubt as to the soundness of the artery, and the same with the femoral where it passes under Poupart's ligament.

His plan was opposed by Pott and Bromfield, the latter of whom said: "An extravagant proposition has been suggested by some people to tie up the principal trunk of an artery in the extremities. I once saw an attempt of this kind in a true aneurism of the ham, in which I shall only remark that the patient died; and I do believe that the embarrassments which occurred, as well as the event of the operation, will deter the gentleman who performed it from making a second attempt in a similar case." Hunter, after quoting this, says: "Now, unfortunately either for Mr. Bromfield or myself, this is the very case from which I have formed favorable ideas of the success of future operations of a similar nature."[1] Pott, writing in 1777, said: "As far as my observation and experience go, the operation for aneurism in the femoral and popliteal arteries, however judiciously performed, will not be successful; that is, will not save the patient's life. I have tried it myself more than once or twice. I have seen it tried by others; but the event has always been fatal. . . . . Nor have I ever seen any other operation that that of amputation which has preserved the life of the patient."

John Hunter was a tremendous worker. His labors were almost incessant. It is probable that his ignorance of what had been done by others was not so great as most persons have inferred from the fact that he rarely quotes or refers to others. It should be remembered that he was for a long time associated with his brother, who was certainly well acquainted with medical literature, and that he daily met men of culture and information, from whom he must have learned a certain amount of what was going on elsewhere. Some of his greatest work was effected through his pupils, Jenner, Abernethy, Astley Cooper, Physick, Everard Home, and others, all of whom were trained by him and perpetuated and expanded his teachings. Since his day mere mechanical dexterity, with some knowledge of ointments and plasters, is no longer thought sufficient for the stock in trade of a surgeon. The peculiar combination of work in anatomy, pathology, and surgery pursued by Hunter has been accepted to a large extent in England since his time as a model of training for a surgeon, and most of the modern leading surgeons have been in their younger days teachers of anatomy and of pathology; which fact has exercised a great influence upon the development and methods of teaching of surgery in England.

The successor of Hunter in English surgery was his pupil and enthusiastic admirer, John Abernethy (1764–1831). He was elected assistant surgeon to St. Bartholomew's in 1787 on the retirement of Mr. Pott, and then began to give private lectures on anatomy at his own house, and his success was such that the governors of St. Bartholomew's were induced to build a lecture theatre, where in 1791 he began to lecture on anatomy, physiology, and surgery.

Abernethy was the first to ligate the external iliac artery for aneurism, in 1796, and in 1798 he ligated the common carotid for hemorrhage. In 1793 he performed neurectomy for neuralgia of the arm commencing in the finger, and proved that after the removal of half an inch of the nerve reunion occurred and the skin of the finger resumed its natural sensibility.[2] He also introduced an improvement in the opening

[1] *Works of John Hunter*, edited by J. F. Palmer (London, 1837, vol. i. p. 547).
[2] See his *Surgical Works* (new edition, vol. ii., 1817, p. 205).

of lumbar abscesses by a method of incision which should admit the least possible amount of air. As he grew older he ceased to operate, and devoted himself more to the treatment of the general health of his patients. The work by which he is best known is his *Essay on the constitutional origin of local diseases.* Abernethy's reputation was not due to his books so much as it was to his lectures, which were dramatic in character, and given with certain eccentricities of manner and speech which considerably contributed to his reputation.

Henry Cline (1750–1827) was a pupil of Hunter, and became surgeon of St. Thomas's Hospital and president of the Royal College of Surgeons in 1823. He was lecturer on anatomy and surgery in the early part of the eighteenth century in the Aldersgate School, and contributed largely to the spread of the new ideas of Hunter. He wrote no special treatises, but had a number of distinguished pupils.

Sir William Blizard (1743–1835), a pupil of Hunter, became surgeon of the London Hospital in 1780 and founder of its medical school, to the cost of which he contributed largely. He was twice president of the College of Surgeons and founded the Jacksonian prize. He was one of the first to ligate the subclavian and the first to ligate the superior thyroid artery. His publications are chiefly in journals.

Sir Everard Home (1763–1832), the son of an army surgeon, was a pupil of John Hunter, who married his sister. He served for a short time in the army, returned to London and became Hunter's assistant, was appointed assistant surgeon to St. George's Hospital in 1787, and surgeon to the same in 1793, after Hunter's death. He was one of Hunter's executors and edited his works, was made a baronet in 1813, and resigned his position at St. George's in 1827. He was a voluminous writer, treating on strictures of the urethra, on ulcers, on diseases of the prostate, on comparative anatomy, etc., but lost his reputation as an author on account of the fact that he destroyed the greater part of the large collection of Hunter's manuscripts, of which he had obtained temporary possession, and which he used in preparing his own papers.

Other London surgeons of this century who should be mentioned are Sir Cæsar Hawkins, surgeon to King George II. and King George III., and surgeon of St. George's Hospital from 1735 to 1774; Thomas Gataker, surgeon of St. George's Hospital, who died in 1769; Joseph Warner (1717–1801), a pupil of Sharp, who became surgeon of Guy's Hospital in 1748, first ligated the common carotid in 1775, and whose *Cases in Surgery* (London, 1754; 4th ed., 1784) are still worth reading; and Sir James Earle (1755–1817), surgeon of St. Bartholomew's Hospital, who is best known by his *Treatise on hydrocele* (London, 1791) and *Observations on the operation for the stone* (London, 1793).

Among the distinguished provincial surgeons of this period may be mentioned Alanson, Park, White, Mynors, and Hey.

Edward Alanson (1747–1823) was a pupil of John Hunter, and surgeon of the Royal Infirmary at Liverpool from 1770 to 1794. He published *Practical observations on amputation and the after-treatment* (London, 1779), in which he recommended a method for obtaining a more complete covering for the end of the bone by cutting the muscles from below upward.

Henry Park (1744–1831) was a student of Pott and Le Cat, and was

surgeon of the Royal Infirmary at Liverpool from 1767 to 1798. His name is connected with the history of resection of the knee and elbow.

Charles White of Manchester published his *Cases in Surgery* in 1770, and first excised the head of the humerus in 1768.

Robert Mynors (1739–1806), a surgeon of Birmingham, published his *Practical observations on amputation* in 1783, and his *History of the practice of trephining the skull, etc.* in 1785.

William Hey (1736–1819), a distinguished surgeon of Leeds, published in 1803 his *Practical Observations in Surgery,* which passed through two later editions, and is still worthy of consultation. He described and named *fungus hæmatodes.* His name is connected with the form of saw devised by him for use in case of fracture of the skull, and with a mode of partial amputation of the foot.

At the end of the century the leading surgeons in Edinburgh were Benjamin and John Bell.

Benjamin Bell (1749–1806) was a pupil of Monro, and became a surgeon of the Royal Infirmary in 1772. In 1778 he published *A treatise on the theory and management of ulcers, etc.,* which went through numerous editions and translations. His *System of surgery* (6 vols., Edinburgh, 1783–87) also passed through many editions, and was translated into German and French, being the favorite systematic treatise for the next twenty years. He insisted strongly on the importance of saving skin in amputations and operations for the removal of tumors, in order to leave as little as possible of the surface of the wound exposed.

John Bell (1765–1820) graduated in medicine in Edinburgh in 1779, and in 1790 opened a private school for anatomy, surgery, and obstetrics. He was ambitious and energetic, and unsparing in his criticisms of his seniors, Monro and Benjamin Bell, thus causing opposition to his school, which, however, was popular and successful. His brother Charles was of great assistance to him in this enterprise. He published a treatise on anatomy which went through many editions: *Discourse on the nature and cure of wounds* (Edinburgh, 1795, with several editions and translations) and *The Principles of surgery* (3 vols., London, 1801–08, 4to), remarkable for the beauty of its engravings. He was the leading operating surgeon in Edinburgh for nearly twenty years. As the result of a bitter controversy with Gregory the number of surgeons at the Royal Infirmary was in 1800 limited to six, and Bell, with others, was excluded, and thus lost the opportunity for clinical teaching.

The story of the rise and progress of surgery in Ireland is told in the *History of the Royal College of Surgeons in Ireland and the Irish Schools of Medicine,* by Charles A. Cameron (Dublin, 1886).

In 1446, King Henry VI. established, by royal charter, a fraternity or guild of barbers for the promotion and exercise of the art of chirurgery. In 1572, Queen Elizabeth granted a second charter to the barbers and surgeons, ordering that they should be called the "Master Wardens and Fraternity of Barbers and Chirurgeons of the Guild of Saint Mary or Magdalene in our city of Dublin," and a third charter was granted in 1687 by James II., giving them full power of the guild over barbers within six miles of Dublin. There were, however, a certain number of surgeons who had no connection of any kind with the company, being army surgeons, or men of liberal education who had studied in the uni-

versities. In 1745 the company began to disintegrate, and in 1784 the union between the barbers and the surgeons was practically dissolved by the creation of the Royal College of Surgeons in Ireland. The beginning of teaching in Dublin is due to Sir Patrick Dun (1642–1713), president of the College of Physicians in Ireland, who left a bequest for "one or two Professors of Physick to read publick Lectures and make publick Anatomical dissections of the several parts of the human Body or Body's of other animals, to read Lectures of Osteology, Bandages, and operations of Chirurgery, to read Botanic Lectures, Demonstrate Plants publickly, and to read Publick Lectures on Materia Medica, for the Instruction of Students of Physick, Surgery, and Pharmacy." The teaching did not actually begin until 1744. The first surgical work published in Ireland appears to be *A Concise and Impartial Account of the Advantages arising to the Public from the general use of a New Method of Amputation* (Dublin, 1763, pp. 13). The second was *Observations on Wounds of the Head* (Dublin, 1776, pp. 177). This was published anonymously, but appeared in a second edition in 1778 under the name of the author, William Dease (1752–98), who was one of the most energetic founders of the Royal College of Surgeons, and one of the first to lecture in it. He was a very successful teacher, and in addition to his work on wounds of the head he published *An Introduction to the Theory and Practice of Surgery* (London, 1780, 8vo) and a work on midwifery which became a popular text-book.

In 1765, Sylvester O'Halloran (1728–1807), a surgeon of Limerick, who had studied in Paris, London, and Leyden, published at London *A Complete Treatise on Gangrene and Sphacelus; with a new Method of Amputation*, which was a valuable contribution to the literature of these subjects.

The Nineteenth Century.

The salient points in the history of surgery in the nineteenth century are the discovery of anæsthetics; the establishment of aseptic and antiseptic surgery upon the scientific foundation of the new science of bacteriology; the development of conservative surgery in the treatment of diseases and injuries of the extremities and of plastic and orthopædic surgery into a specialty; the rise and progress of abdominal and intracranial surgery; the entrance of two new nations, the United States and Russia, into the field of surgical discovery, literature, and teaching; the change in the methods of educating surgeons; the formation of surgical societies and associations; and the cosmopolitan character of the art developed by rapid international communication and by periodicals. The founding of museums like those of Hunter and Dupuytren, the removal of restrictions on the study of anatomy, the great advances made in pathological anatomy and experimental pathology, and the development of ophthalmology, otology, gynæcology, dermatology, and laryngology into their present highly specialized forms, have also exerted a strong influence upon surgery and the work of the general surgeon.

With the increasing accumulation of the people in cities have come increased demands and opportunities for surgeons, for increase of hospitals and medical schools, for skilled nursing, ingenious mechanics for the making of instruments and apparatus, and, in short, for many means of

carrying out suggestions for improvements through the aid of competent assistants.

More progress in the art has been made since 1800 than had been made in the two thousand years preceding that date, and this has been largely due to work done in the dissecting-room and in the laboratory. Consider for a moment some of the differences between the resources of the surgeon of 1800 and those of the surgeon of the present day. The surgeon of 1800 had little more knowledge than had Hippocrates of the chief causes of danger after operations, such as suppuration, pyæmia, or tetanus, and groped wildly for means to avoid them. He had no clinical thermometer, and could only guess at temperature and fever; no hypodermic syringe; no anæsthetic; no definite knowledge of the importance of blood-saving or of the best means of doing it. He knew nothing of plastic surgery, of tenotomy, of the ophthalmoscope, or of the use of the microscope in diagnosis, and had only just learned how to ligate arteries and to treat ordinary wounds in a simple and sensible way. The really great surgeon of that day who was bold, cool, and skilful could perform most of the great operations, such as amputation, ligature of large arteries, removal of tumors, Cæsarean section, and the like, but such men were few and far between.

At the beginning of the century London was the centre of surgical improvement and of surgical teaching, and the leading surgeons at that time were Abernethy, Cline, Blizard, Home, Astley Cooper, Lawrence, and Wardrop. The first four of these have been referred to in a previous section.

Astley Paston Cooper (1768–1841), a native of Norfolk, was apprenticed in 1784 to his uncle, William Cooper, surgeon to Guy's Hospital, and was soon transferred to Cline, then surgeon at St. Thomas's. He attended John Hunter's lectures and spent one winter at the Edinburgh Medical School, was appointed demonstrator of anatomy at St. Thomas's in 1789, and two years later became joint lecturer with Cline in anatomy and surgery. In 1800 he was appointed surgeon to Guy's on the resignation of his uncle. In 1805 he ligated the common carotid for aneurism, and in 1817 the abdominal aorta. In 1820 he performed a simple operation on King George IV., which resulted in his being made a baronet. In 1825 he resigned his lectureship at St. Thomas's and induced the formation of a separate medical school at Guy's, in which his pupil, Aston Key, lectured on surgery, and his nephew, Bransby Cooper, on anatomy. He was an extremely skilled anatomist, and some of his most valuable contributions are connected with his work in this direction. Among them may be mentioned his treatises on hernia (in two parts, 1804–07), the second edition of which appeared in 1827, the illustrations to which are said to have been so expensive that he lost a thousand pounds by the publication. His book on *Dislocations and Fractures of the Joints* was published in 1822; his *Lectures on the Principles and Practice of Surgery*, with additions by Tyrrell, in three volumes, in 1824–27: the eighth edition of this appeared in 1837; and his *Illustrations of Diseases of the Breast*, Part I., in 1829; his observations on the *Structure and Diseases of the Testes* in 1830; and his work on the *Anatomy of the Breast* in 1840. He seems to have read little, his books contain few references to the work of other men, and his reputation and influence

were due more to his personality and his great skill as an operator than to his contributions to science or practice.

William Lawrence (1783–1867), the son of a surgeon, was a pupil of Abernethy and his demonstrator of anatomy for twelve years. He became a member of the College of Surgeons in 1805, won its prize for an essay on hernia in 1806, was appointed assistant surgeon to St. Bartholomew's Hospital in 1813, and in 1815 became professor of anatomy and physiology at the College of Surgeons. His lectures were considered to flavor of infidelity, and led to a sharp controversy, which ended by his recanting the objectionable opinions and withdrawing his book, *On the History of Man*, from sale as far as he could. He was connected with the Aldersgate Medical School, and in 1823 succeeded Abernethy as lecturer on surgery at St. Bartholomew's. His principal contributions to surgical literature are his *Treatise on Diseases of the Eye* (1833) and his *Lectures on Surgery*, published in 1863. He was a skilled anatomist, an eloquent lecturer, and an erudite author.

James Wardrop (1782–1869), a native of Scotland and educated in Edinburgh, came to London in 1809. In 1826 he founded a hospital under the title of the "West London Hospital of Surgery," and in the same year, in conjunction with Mr. Lawrence, gave a course of lectures at the Aldersgate Street School. His abusive articles in *The Lancet* in 1826–27 probably prevented him from having any official connection with the colleges. In 1828 he was made surgeon to the king. He wrote for *The Lancet* (1834, vol. ii.) a series of grossly personal and abusive papers entitled "Intercepted Letters," purporting to be written by Halford, Brodie, McMichael, and others, after which the heads of the profession in London had as little as possible to do with their author. In 1835 he joined the Hunterian School of Medicine and gave a course of lectures on surgery. His best-known work is that on the *Morbid Anatomy of the Eye*. His name in the history of surgery is chiefly connected with the operation first proposed by Brasdor for the cure of aneurism by placing a ligature on the distal side of the tumor, which operation Mr. Wardrop performed successfully in two cases of aneurism of the carotid artery, and in one case of aneurism of the innominate artery, in which he tied the subclavian.

The following surgeons also belong to the early part of the century:

Joseph C. Carpue (1764–1846), who in *An Account of two Successful Operations for Restoring a Lost Nose, etc.* (London, 1816, 4to), introduced rhinoplasty by the Indian method, and recalled attention to the high operation for stone in his excellent historical sketch, *The History of the High Operation for the Stone* (London, 1819).

Samuel Cooper (1780–1848), surgeon of the University College Hospital from 1831 to 1848, published his *Surgical Dictionary* in 1809, the first comprehensive and complete work of the kind in existence, and the continued popularity of which is shown by the fact that its eighth edition was published in 1861–72. Every edition is valuable to the student of the progress of surgery in the nineteenth century.

Alexander Copland Hutchinson, a naval surgeon, published *Practical Observations on Surgery* in 1816 (2d ed. 1826), and *Some further Observations on the subject of the proper period for Amputating in Gunshot Wounds, etc.*, in 1817.

Charles Aston Key (1793–1849), a pupil of Astley Cooper, whose niece he married, became demonstrator of anatomy at St. Thomas's Hospital in 1820, assistant surgeon to Guy's Hospital in 1821, surgeon to the same in 1824, and professor of surgery in its school in 1825. He ligated the subclavian artery in 1825, and tied the carotid for aneurism in 1830; introduced the use of the straight staff in lithotomy, and the method of dividing the stricture external to the sac in strangulated hernia, and was one of the most popular teachers in London.

From 1820 to 1835 the leading London surgeons, in addition to those already referred to, were Brodie, Bell, and Travers.

Sir Benjamin Collins Brodie (1783–1862) was a native of Wiltshire, England. He studied in London, and began to assist in teaching at the Windmill Street School in 1805, when he was twenty-two years of age. In 1803 he became the pupil of Sir Everard Home, and in 1808 assistant surgeon at St. Thomas's Hospital, where, in 1822, on the death of Mr. Griffiths, he became full surgeon, from which position he retired in 1840. He devoted himself largely to physiological experiments, some results of which appeared in the celebrated Croonian Lecture, delivered in 1810, on the influence of the brain on the action of the heart, in which he reported the results of the use of the woorara poison, and in a paper published in 1814 on *The Influence of the Pneumogastric on the Secretions of the Stomach*. Of his surgical writings, the first, and perhaps the most important, is his *Pathological and Surgical Observations on the Diseases of the Joints*, published in 1818, and appearing in a fifth edition in 1851. His lectures *On Diseases of the Urinary Organs* appeared in 1832, a fourth edition being issued in 1849. In 1846 he published a volume of lectures on various subjects in pathology and surgery. His complete works, with an autobiography, are published in three volumes (8vo, London, 1865). He devoted himself to the scientific side of surgery rather than to operations, although he was a very successful operator, and for over thirty years was recognized as the head of the medical profession in London.

Sir Charles Bell (1778-1842) was a younger brother of John Bell of Edinburgh, under whom he studied and whom he soon began to assist in the teaching of anatomy. In 1804 he went to London, where he began to teach in his own house in 1807, after which he associated himself with Mr. Wilson in the Great Windmill Street School, where he came into competition as a teacher with Cline, Cooper, and Abernethy, and met with great success. In 1812 he began to deliver clinical lectures in the Middlesex Hospital, to which he was appointed surgeon in 1814. In 1836 he accepted the chair of surgery in the University of Edinburgh, which he held until his death. His publications were voluminous, and include his *System of Operative Surgery* (2 vols., 1807–09), his paper on *Gunshot Wounds* (in 1814), his *Surgical Observations* (2 vols., London, 1816–18), and his *Illustrations of the Great Operations in Surgery, etc.* (in 1821). His fame, however, is mainly due to his papers relating to the nervous system, the result of careful and long-continued experimental work. His *Idea of a New Anatomy of the Brain*, printed in 1811, is a pamphlet of 36 pages which forms an epoch in the history of discoveries relating to the structure and functions of that organ. He was a skilled artist, a dexterous operator, and a conscientious and popular teacher, whose fame has increased instead of diminishing since his death.

Benjamin Travers (1783–1858) was a pupil of Astley Cooper, prosector of anatomy at Guy's Hospital, and surgeon of St. Thomas's Hospital in 1815. He was a skilled ophthalmologist, and his *Synopsis of the Diseases of the Eye* (1820) was the best systematic treatise on that subject which had yet appeared in English. His tastes led him to the scientific rather than to the practical aspect of surgery, and his treatises on *Constitutional Irritation* (1824), *A further Inquiry concerning Constitutional Irritation and the Pathology of the Nervous System* (1834), and *The Physiology of Inflammation* (1844) are specimens of physiologico-pathological investigation of the highest order of merit. He contributed some valuable papers on aneurism and the ligature of arteries to the *Medico-chirurgical Transactions*, and one on wounds of the veins in the *Surgical Essays*, published by Astley Cooper and himself in 1818–19. He introduced the use of mercury in non-specific iritis and in other forms of inflammation. Of all the English surgeons of this period, there are none whose writings are more interesting to-day than are those of Travers.

In Edinburgh there was no surgeon of special note engaged in teaching after John Bell was excluded from the infirmary and gave up his school. No separate chair of surgery was established in the university until 1831, owing to the persistent opposition of the second Monro, who claimed to be professor of surgery as well as of anatomy. A chair of surgery was instituted in the College of Surgeons in 1804, which was maintained until the chair was created in the university in 1831, and this was filled by Dr. John Thomson (1765–1846), who became surgeon of the Royal Infirmary in 1800, and began to give clinical lectures therein on surgery in the private theatre in 1801, this being then the only separate course on this subject given in the city. In 1806 a chair of military surgery was instituted in the university, to which Dr. Thomson was appointed. His *Lectures on Inflammation, etc.* (Edinburgh, 1813) passed through several editions and translations, and his *Report of Observations made in the British Military Hospitals in Belgium after the Battle of Waterloo, etc.* is of interest to army surgeons.

A chair of clinical surgery was created in the university in 1803, which was filled by the appointment of James Russell, a surgeon of the Royal Infirmary, who published in 1794 *A Practical Essay on a certain Disease of the Bones termed Necrosis* (Edinburgh, 8vo), and in 1833, after his retirement, *Observations on the Testicles.*

Sir George Ballingall (1780–1855) entered the army in 1806, and became professor of military surgery in the university in 1823. His principal work is his *Outlines of the course of lectures on Military Surgery, etc.*, published in 1833, which reached a fifth edition in 1855.

Here also may be mentioned John Hennen (1779–1828), a distinguished English military surgeon, a native of Ireland, who studied in Dublin and Edinburgh, and entered the army in 1800. His chief work is *Observations on some important points in the practice of Military Surgery, etc.* (Edinburgh, 1818), and subsequent editions, called *Principles of Military Surgery* (Edinburgh, 1820).

In Glasgow at the beginning of the century the leading surgeon was John Burns (1775–1850), who was the first lecturer on anatomy who was unconnected with the university. His *Principles of Surgery* (2 vols., London, 1829–38) was dry and had no success, but his *Principles on Midwifery* reached a tenth edition. In 1815 he was appointed Regius professor of surgery in the University of Glasgow, and held this position until his death.

Allan Burns (1781–1813) was a brother of John, whose demonstrator he became in the anatomical school. He first described the falciform process of the fascia lata in its relations to femoral hernia in a paper which he published in the *Edinburgh Medical Journal* in 1806. His *Observations on the Surgical Anatomy of the Head and Neck* (Glasgow, 1811) is a valuable surgical work, which contains, in addition to the anatomy, accounts of numerous cases of tumors in this region, a discussion on the treatment of aneurism, etc. He suggested the ligature of the innominate artery, and it was this suggestion which led to the first performance of the operation by Mott in 1821.

Between 1825 and 1840 four surgeons in Edinburgh became distinguished, and two of them were transferred to London to take high places there. These four were Lizars, Liston, Fergusson, and Syme.

John Lizars (1783–1860) was a pupil of John Bell, and began to teach anatomy in a private school in 1815. In 1831 he became professor of surgery in the Royal College of Surgeons. He was the first in Scotland to ligate the innominate, and the second to perform ovariotomy, an operation which became known mainly through his *Observations on Extirpation of Diseased Ovaria* (Edinburgh, 1825, fol.). His name is also connected with early operations for excision of the jaws. In 1839 he ceased teaching and devoted himself to private practice. He was a skilled anatomist and a brilliant and daring operator.

Robert Liston (1794–1847), a native of Scotland, was educated in Edinburgh and London, and began to teach anatomy in 1818. In 1823 he gave up this teaching in favor of Syme and devoted himself entirely to surgery. He became surgeon of the North London Hospital and professor of clinical surgery in University College, London, in 1834, and rapidly achieved a great success. He was possessed of great personal strength and was a brilliant operator, having the reputation of being the most dexterous surgeon of his time. His method of flap-amputation became very popular, and he made numerous contributions to the surgery of amputation, aneurism, lithotomy, and lithotrity. He would amputate the thigh with only the aid of one person to hold the limb and tie the ligatures, compressing the artery with his left hand, using no tourniquet, and doing all the cutting and sawing with the right. A large part of his skill and success was due to his knowledge of anatomy, which he kept up by dissections throughout his life. He excised the upper jaw for a formidable tumor in 1836, and the success in this instance brought to him a crowd of cases. His rashness is exemplified in the celebrated case in which he punctured an aneurism of the carotid, supposing it to be an abscess, although his house-surgeon had told him that the tumor pulsated. His principal publications were his *Elements of Surgery*, published in 1831, and his *Practical Surgery*, in 1837, both of which works went through several editions.

William Fergusson (1808–77), a native of Scotland, was educated at Edinburgh, being a pupil of Robert Knox. In 1831 he was elected surgeon to the Edinburgh Royal Dispensary, being at this time lectur-

ing on surgical anatomy in association with Knox, and was the first to ligate the subclavian in Scotland. In 1840 he accepted the professorship of surgery at King's College, London. In 1855 he was appointed surgeon extraordinary, and in 1867 serjeant surgeon to the queen. For many years he was the leading surgical operator in London. He resigned his professorship of surgery in 1870, but remained clinical professor of surgery and senior surgeon at King's College Hospital until his death. He was created a baronet in 1866. His special contributions to the art were largely in the line of what he called "conservative surgery," a term which he first applied in 1852 to the avoidance of amputation by means of resections and to the removal of no more than is absolutely necessary in cases of diseases of the bones. His name is especially associated with operations of hare-lip and cleft palate, with operations on the jaws, the excision of joints, and with lithotomy and lithotrity. His principal contribution to literature is his *System of Practical Surgery* (London, 1842; 5th ed. 1870). He also contributed many valuable papers to the periodicals. His lectures on the *Progress of Anatomy and Surgery during the Present Century* (1867) are extremely interesting to the student of the history of surgery.

James Syme (1799–1870) was a pupil of Dr. Barclay, and when only nineteen years old was entrusted with the charge of his cousin Liston's anatomical rooms, in which he began to teach in 1822. In 1825 he began to teach surgery, but, having quarelled with Liston, he had no chance to obtain an appointment in the Royal Infirmary, and therefore started a private hospital. When he succeeded Russell in the clinical chair in the university, he became one of the surgeons of the infirmary in 1833, and after Liston went to London in 1834 the greater part of the operative surgery of Scotland fell into his hands. In 1831 he published his treatise on the *Excision of Diseased Joints*, which was the first systematic attempt to show that excision ought, in most cases, to supersede amputation, and it had the greatest influence in bringing about this change in practice. The first edition of his *Principles of Surgery* was published in 1822; the fifth edition in 1863. This is an extremely concise work, and the fifth and last edition is smaller than the first. In 1847 he published his *Contributions to the Pathology and Practice of Surgery*, in which he gives an account of the first eight cases of amputation at the ankle-joint by the method which is still known by his name. The date of his first case of this kind is September 8, 1842. In 1847 he accepted a call as surgeon to University College, London, on the death of Liston, but he did not find the place satisfactory, and four months later he returned to Edinburgh. He was a bold, cool, and skilful operator, but not a rash one. Among his most remarkable operations may be mentioned those for aneurism by incision of the tumor and ligations above and below, which operation he performed in cases of aneurism of the carotid, the axillary artery, and the iliac artery.

In 1835 the greater part of the medical teaching in London was still given in private schools having no connection with hospitals, the oldest and best known being the Windmill Street and Aldersgate Street Schools. The Great Windmill Street School was established by William Hunter about 1746, and numbered among its teachers the two Hunters, Baillie, Cruikshank, Wilson, Mayo, Shaw, Brodie, Charles Bell, Carpue, and

Cæsar Hawkins, but was finally destroyed by the establishment of the London University in the vicinity of the Middlesex Hospital in 1836. The Aldersgate School was also of old date, and numbered among its teachers Wardrop and Lawrence.

The hospital schools of Guy's and St. Thomas's, which had been united in 1768, the surgical lectures being given at St. Thomas's and the medical at Guy's, were practically separated in 1825, and entirely so in 1836.

After Liston and Fergusson came to London clinical hospital teaching increased rapidly in favor and importance; the hospital schools began to flourish and the private schools to disappear. At this period, in addition to those already mentioned, the principal surgeons were Guthrie, Green, Lloyd, South, Morgan, Stanley, and Hawkins.

George James Guthrie (1785–1856), an apprentice of a London surgeon, was appointed hospital mate in the army, and sent to the York Hospital at Chelsea when he was only fifteen years old. He became assistant surgeon in 1801, accompanied his regiment to North America in 1806, and served during the War of the Peninsula in Spain, becoming surgeon of the forces in 1810, and commanding three divisions of cavalry at the battle of Albuera. He was placed on half pay in 1814, and went to the battle of Waterloo, where he performed an amputation at the hip-joint on a Frenchman, and tied both ends of the peroneal artery, being successful in each case. He became assistant surgeon to the Westminster Hospital in 1823, surgeon to the same hospital in 1827, and professor of anatomy at the Royal College of Surgeons in 1828. His treatise *On gunshot wounds of the extremities requiring the different operations of amputations, etc.*, 1815, urging prompt amputation, marks an epoch in the history of military surgery; the sixth edition, including additions relating to the Crimean War, was printed in 1855. In addition to this he published *A treatise on the operations for the formation of an artificial pupil, etc.* (1819), *Lectures on the operative surgery of the eye* (1823; 3d ed. 1838), and *On injuries of the head affecting the brain* (4to, 1842; 2d ed. 1847). He also contributed many papers to medical journals.

Joseph Henry Green (1791–1863), a nephew and pupil of Henry Cline, became surgeon to St. Thomas's Hospital in 1820 and professor of surgery in King's College in 1830. In 1837 he resigned his professorship, and in 1852 his position at St. Thomas's. His publications were chiefly short papers in medical journals.

Eusebius Arthur Lloyd (1795–1862), a pupil of Abernethy, became assistant surgeon to St. Bartholomew's in 1824, and surgeon in 1847, from which position he retired in 1861. He gained the Jacksonian prize for 1818 by his essay on scrofula, enlarged and published in 1821.

John Flint South (1797–1882), an apprentice of Henry Cline, was admitted as a member of the Royal College of Surgeons in 1819, after which he studied in Germany, and on his return became demonstrator at St. Thomas's Hospital, then lecturer on surgery, and ultimately surgeon to the hospital. He is best known by his translation of Chelius's *System of surgery*, to which he added a large number of notes, greatly increasing the value of the work. He also collected materials for a *History of the craft of surgery in England*, which was published in 1886,

after his death, under the supervision of Mr. D'Arcy Power, and is a valuable book of reference. Through his efforts the remains of John Hunter were transferred to Westminster Abbey, and the inscription on the tablet is from his pen.

John Morgan (1797–1847), a pupil of Astley Cooper, assisted Mr. Key as demonstrator of anatomy in a private school, was in 1821 appointed assistant surgeon, and in 1824 surgeon, to Guy's Hospital, in the school of which he lectured on anatomy and surgery. In the latter part of his career he devoted himself to ophthalmology. He was an excellent operator, ligated the iliac artery several times, was one of the first to perform flap-amputations, and was the first to use metal sutures in wounds; he was also one of the first to perform ovariotomy. His principal work was *Lectures on diseases of the eye* (1839). He also assisted Dr. Addison in *An Essay on the operation of poisonous agents in the living body* (1829).

Edward Stanley (1791–1862) studied at St. Bartholomew's, to which he became assistant surgeon in 1816 and surgeon in 1838. He was twice president of the Royal College of Surgeons. His principal publication was *A Treatise on the diseases of the bones* (1849).

Cæsar H. Hawkins (1798–1884), prosector of anatomy in the school of Great Windmill Street for many years, became surgeon of St. George's Hospital in 1829, and retired in 1861. In 1861 he was president of the Royal College of Surgeons, and in 1862 serjeant surgeon to the queen, succeeding Brodie, being the fourth of his family to hold this position. His works were collected and published in two volumes in 1874.

Among the distinguished provincial surgeons of the century were George Freer of Birmingham, author of *Observations on aneurism and some diseases of the arterial system* (4to, 1807); Joseph Hodgson of Birmingham, best known by his treatise on *Diseases of the arteries and veins* (London, 1815; translated into French and German); John H. James (1789–1869) of Exeter, the author of the Jacksonian prize essay for 1818 on inflammation, and the second to ligate the abdominal aorta; John Green Crosse (1790–1850) of Norwich, author of the Jacksonian prize essay for 1825 on urinary calculus, and whose fine library on diseases of the urinary organs came into the possession of Professor S. D. Gross, and was destroyed by fire in Louisville; John Gay (1791–1870) of Swindon, a pupil of Abernethy; John Smith Soden (1780–1863) of Bath; George M. Jones (180?–1861) of Jersey, a brilliant operator, who performed excision of the knee-joint without knowing of Fergusson's operation a few weeks before, excised the hip and ankle-joints, extirpated the scapula, etc.; William Sands Cox (1802–76), one of the founders of the Birmingham School of Medicine in 1828, author of *Memoir on amputation of the thigh at the hip-joint* (1845); Thomas Pridgen Teale (1801–68), founder of the Leeds School of Medicine, author of *A practical treatise on abdominal hernia* (1846; translated into German 1848, and into Dutch 1849), and best known by his work, *On amputation by a long and short rectangular flap* (1858); Joseph Jordan (1786–1873) of Manchester, the first provincial lecturer on anatomy and surgery whose certificates were recognized by the Royal College of Surgeons (in 1821), founder of the Lock Hospital in 1819,

and surgeon of the Manchester Infirmary after 1835; George Southam (1815–70) of Manchester, founder of the Chatham Street School of Medicine in 1850, surgeon to the Royal Infirmary in 1855, and professor of surgery in Owens College on its foundation in 1872, author of *Regional surgery* (3 parts, 1882–86); and Joseph Sampson Gamgee (1828–86), the son of a veterinary surgeon, who studied at University College, London, and after graduation studied at Paris, Pavia, and Florence. In 1857 Gamgee was appointed surgeon to the Queen's Hospital at Birmingham, which position he retained until 1881, becoming one of the most distinguished provincial surgeons of England. He was a brilliant operator and a fluent speaker. He urged the dry, infrequent dressing of wounds. His principal publications are—*On the advantages of the starched apparatus in the treatment of fractures and diseases of joints* (1853), *Researches in pathological anatomy and clinical surgery* (1856), *On the treatment of fractures of the limbs* (1871), and *On the treatment of wounds* (1878).

The leading Dublin surgeons during the century were Colles, Crampton, Carmichael, Porter, Cusack, Adams, Harrison, Bellingham, Smith, and Tufnell.

Abraham Colles (1773–1843) graduated at Edinburgh in 1797, and in 1804 became professor of surgery in Dublin, which position he held for thirty-two years, and for twenty years was the chief of the Irish surgeons. His name remains connected with the form of fracture of the carpal extremity of the radius described by him in the *Edinb. Med. and Surg. Journal* (1814), and with the so-called "Colles' law"—*i. e.* that a mother infected with syphilis through the fœtus acquires a certain degree of immunity and will not suffer by suckling the infant. In 1816 he first tied the subclavian within the scaleni. His principal surgical publications are a treatise on surgical anatomy (1811) and *Lectures on the theory and practice of surgery* (2 vols., 1844–45).

Sir Philip Crampton (1777–1858), a native of Dublin, was appointed surgeon to the Meath Hospital when twenty-one years old, and was one of the founders of the first private school for anatomy and surgery in Dublin. He was a skilful operator and an eloquent lecturer, and contributed numerous papers to medical journals.

Richard Carmichael (1779–1849), a native of Dublin, but of Scotch descent, passed his examination as assistant surgeon when seventeen years old, and in 1803 settled in Dublin and was appointed surgeon to St. George's Hospital. In 1826 he was one of the founders of the Richmond School of Medicine, giving lectures on surgery, and was very prominent in the various medical associations of his time. He bequeathed to the College of Surgeons in Ireland the sum of £3000, the interest of which was to be used in giving prizes every four years for the best essays on the state of the medical profession in Great Britain and Ireland, and these, known as the Carmichael prize essays, are valuable historical documents. His principal works relate to venereal diseases.

William Henry Porter (1790–1861), a pupil of Mr. Crampton, was elected surgeon to the Meath Hospital in 1819, and in 1836 succeeded Colles as professor of surgery in the Royal College of Surgeons. He was a bold operator, an eloquent lecturer, and an excellent teacher. Besides a number of important papers in the journals, he published

Observations on the surgical pathology of the larynx and trachea (1826; 2d ed. 1837), a classical work.

James William Cusack (1787–1861), surgeon to Stevens's and Swift's hospitals, was in 1852 elected to the professorship of surgery in the University of Dublin, founded that year, and was three times president of the College of Surgeons. He was a bold and skilful operator, trained many pupils, and enjoyed the entire confidence of his professional brethren. He contributed some papers to periodicals, but wrote no special work.

Robert Adams (1791–1873), surgeon to the Jervis Street and the Richmond hospitals, was one of the founders of the Richmond (or, as it was afterward called, the Carmichael) School of Medicine, and in 1861 was appointed Regius professor of surgery in the University of Dublin. His principal work was his *Treatise on rheumatic gout, or chronic rheumatic arthritis of all the joints* (1857; 2d ed. 1873).

Robert Harrison (1796–1858), a native of Cumberland, was apprenticed to Colles in 1810, took the degree of M. B. in 1824, and was appointed professor of anatomy and surgery in the University of Dublin in 1837. His principal work was *The surgical anatomy of the arteries* (2 vols., 1824–25).

O'Bryen Bellingham (1805–57) graduated at Edinburgh in 1830, and was elected surgeon to St. Vincent's Hospital in 1835. His name is especially connected with the treatment of aneurism by compression, a method which was systematized and made popular by Dublin surgeons, and with regard to which his little book, *Observations on aneurysm, and its treatment by compression* (1847), is still a valuable work.

Robert William Smith (1807–73), a native of Dublin and an apprentice of Richard Carmichael, was a teacher of surgery in the Richmond Hospital School, and in 1849 was appointed the first professor of surgery in the School of Physic of the University of Dublin, the chairs of anatomy and surgery having been united prior to that date. He was eminent as a teacher and as a skilled pathologist, was for thirty-five years secretary of the Dublin Pathological Society, and made numerous and valuable contributions to surgical literature. His principal work is *A treatise on fractures in the vicinity of joints, and on certain forms of accidental and congenital dislocations* (1847).

Thomas Jolliffe Tufnell (1819–75), a native of Chippenham, Wilts, studied in London under Brodie and Cæsar Hawkins, entered the army medical service in 1841, and after the Crimean War retired from active service and settled in Dublin. He was surgeon to the City of Dublin Hospital and professor of military surgery in the school of the College of Surgeons. His principal works were—*Practical remarks on the treatment of aneurism by compression* (1851) and *The successful treatment of internal aneurism* (1864; 2d ed. 1875).

In addition to those already mentioned, and excluding those yet living, the following have been the prominent London surgeons since the middle of the century:

James Luke (1798–1881) studied at the London Hospital, where he became lecturer on anatomy in 1823, lecturer on surgery in 1825, and surgeon to the hospital in 1833, which position he resigned in 1861. His name is specially connected with a simplified method of operation for femoral hernia.

Frederic Carpenter Skey (1798–1872), a pupil of Abernethy, was for ten years lecturer on surgery in the Aldersgate School, and in 1843 became professor of anatomy at St. Bartholomew's Hospital, to which he had been elected assistant surgeon in 1827, and where he became surgeon in 1854, retiring in 1864. His principal work was his treatise on *Operative surgery* (1850; 2d ed. 1858).

John Hilton (1804–78) studied at Guy's Hospital, in the medical school of which he was appointed demonstrator of anatomy in 1828, and held this position for fourteen years, being reputed to be the best anatomist in London. In 1845 he was appointed assistant surgeon, and in 1849 surgeon, at Guy's. He is best known by his book on *Rest and pain* (1863; 2d. ed. 1877), one of the most valuable contributions of the century to surgical literature.

Edward Cock (1805–92), nephew and pupil of Astley Cooper, was appointed demonstrator of anatomy in Guy's Hospital medical school on its foundation in 1825, assistant surgeon to the hospital in 1838, and surgeon in 1848, retiring in 1871. He is best known by his papers on puncture of the bladder through the rectum (1852) and on a method of opening the urethra in cases of impermeable stricture (1866).

William Coulson (1802–77), a pupil of Tyrrell, studied in Berlin for two years, and on his return was associated with Tyrrell, Jones, Quain, Lawrence, and Wardrop in the medical school in Aldersgate street, in which he taught anatomy. At the same time he was on the editorial staff of *The Lancet*. In 1851 he was elected surgeon to St. Mary's Hospital. His principal works relate to diseases of the urinary organs.

Henry Hancock (1809–80) studied under Guthrie, became demonstrator of anatomy at the Westminster Hospital School in 1835, and in 1839 assistant surgeon at Charing Cross Hospital, where he succeeded to the lectureship of surgery on the death of Mr. Howship in 1841. His principal work was *On the operative surgery of the foot and ankle-joint* (1873).

Thomas Blizard (1811–88), a native of London and nephew of Sir William Blizard, became assistant surgeon to the London Hospital in 1833 and surgeon in 1849, from which position he retired in 1869. His principal publications were—*A Treatise on tetanus* (Jacksonian prize essay, 1836), *Practical treatise on the diseases of the testicle, spermatic cord, etc.* (London, 1843; 4th ed. 1878), and *Observations on the diseases of the rectum* (London, 1851; 4th ed. 1876). He contributed a number of very valuable papers to the *Medico-chirurgical Transactions*, including his "Improved observations on acute ulcerations of the duodenum in cases of burn" (1842).

Campbell de Morgan (1811–76), a younger brother of the mathematician, Augustus de Morgan, and a pupil of Sir Charles Bell, studied at University College, and in 1842 was elected assistant surgeon to the Middlesex Hospital, becoming full surgeon in 1848. In 1866–67 he became joint lecturer on surgery with Mr. Shaw. He contributed to Holmes's *System of surgery* and some papers to periodicals, and published *The origin of cancer considered with reference to the treatment of the disease* (1872).

John Gay (1813–85) studied in London, and in 1836 became surgeon to the newly-established Royal Free Hospital. In 1856 he was surgeon

to the Great Northern Hospital. His principal works are—*On femoral rupture* (1848) and *On varicose veins* (1868). He must not be confounded with John Gay (1791–1870), a distinguished surgeon at Swindon and a pupil of Abernethy, who graduated in 1811, or with his son of the same name, who died at Swindon in 1869.

Robert Druitt (1814–83) was not connected with any hospital and did not practise surgery, but his *Vade Mecum*, the first edition of which appeared in 1838 and contained the teachings of Green and of Joseph Henry, met with great favor, reaching its eleventh edition in 1878 and a sale of forty thousand copies.

Richard Holmes Coote (1817–72), a pupil of Sir William Lawrence, became demonstrator of anatomy at St. Bartholomew's in 1846, assistant surgeon to the hospital in 1852, and surgeon and lecturer on surgery in 1863. He contributed many papers to journals and transactions, and is best known by his treatise *On joint diseases*, published in 1867.

John Marshall (1818–91), a student and assistant of Liston, became surgeon of University College Hospital and professor of surgery, in which position he gave special attention to physiology and pathology and to the views of Virchow, Cohnheim, and other German authorities. During the latter part of his life he was president of the General Medical Council. His principal published work was his *Outlines of physiology* (2 vols., 1867).

Alfred Poland (1822–72), a pupil of Mr. Aston Key, became demonstrator of anatomy at Guy's Hospital in 1845, assistant surgeon of the hospital in 1849, and full surgeon in 1861. His *Essay on gunshot wounds and their treatment* received the Jacksonian prize at the College of Surgeons, and his paper, *The injuries and wounds of the abdomen*, gained for him the Fothergillian medal of the Medical Society of London. He contributed many papers to *Guy's Hospital Reports* and also to the weekly medical journals, but wrote no important separate work.

John Cooper Forster (1823–86), the son of a medical man, studied at Guy's, where in 1850 he was appointed demonstrator of anatomy, in 1855 assistant surgeon, and in 1870 surgeon, which latter position he resigned in 1880. He performed the first gastrostomy in England in 1858. His only published separate work was on *The surgical diseases of children* (1860).

George William Callender (1830–79) studied at St. Bartholomew's, where he became assistant surgeon in 1861, surgeon in 1871, and lecturer on surgery in 1873. He contributed largely to *St. Bartholomew's Hospital Reports*, of which he was surgical editor from 1865 to 1873, and also furnished many papers and notes of clinical lectures to journals and transactions. The *Transactions of the Royal Society* for 1869 contain an important paper by him on "The formation and growth of the bones of the human face." He was one of the first to carry out in detail asepsis in surgery, as contradistinguished from antisepsis. His only separate work was *Anatomy of the parts concerned in femoral rupture* (1863).

Peter Charles Price (1832–64), the son of a physician, studied at King's College, and became assistant to Mr. Fergusson in 1854. He was appointed assistant surgeon to King's College Hospital in 1861. He paid special attention to the pathology and surgery of the joints, and more

especially to the diseases of the knee and their treatment by excision. His principal work is *A Description of the diseased conditions of the knee-joint which require amputation of the limb, and those conditions which are favorable to excision of the joint, etc.*, published after his death in 1865.

Charles Frederick Maunder (1832–79) studied in Bristol, London, Edinburgh, and Paris, served in the army during the Crimean War, and was appointed assistant surgeon to the London Hospital in 1860, and surgeon in 1869. He was a bold and skilful operator, and his text-book on operative surgery (1860; 2d ed. 1873) was an excellent manual.

William Frederick Teevan (1833–87) was educated at University College, and was elected assistant surgeon of the West London Hospital for Urinary Diseases in 1866, after which he devoted himself more especially to the surgery of the genito-urinary organs. He is best known by his work, *Inquiry into the causation, diagnosis, and treatment of fractures of the internal table of the skull* (1864), which is a classical work of reference on this subject.

Marcus Beck (1843–93) studied at Glasgow under Mr. Joseph Lister, his cousin, and at University College, London, and in 1873 was appointed assistant surgeon to University College Hospital, becoming surgeon in 1885 and lecturer on surgery in the same year. He was one of the first to introduce antiseptic methods in surgery in London, and, though not a voluminous writer, made some valuable contributions to surgical literature, including a paper on "Consecutive nephritis," or surgical kidney, in Reynolds's *System of medicine*, and a part of the report on pyæmia and septicæmia in the *Transactions of the Pathological Society* for 1879.

Frederick LeGros Clark (1811–92), an apprentice of Travers, studied at St. Thomas's Hospital, beginning in 1827, and was appointed assistant demonstrator of anatomy in 1830. In 1839 he became lecturer on anatomy and physiology, in 1843 assistant surgeon to the hospital, and in 1853 full surgeon, which office he retained for twenty years. When Mr. South resigned the chair of surgery Mr. Clark succeeded him, and retained the office until he retired from the hospital in 1873. His principal work was his *Lectures on the principles of surgical diagnosis: especially in relation to shock and visceral lesions* (London, 1870; 2d ed. 1872). A number of his papers in journals and addresses were collected and printed under the title of *Papers on surgery, pathology, and allied subjects* (8vo, London, 1889).

The two greatest advances in surgery in the nineteenth century are the introduction of anæsthetics, which was due to American surgeons, and will be referred to hereafter, and the introduction of systematic and scientific antisepsis and asepsis in the treatment of wounds and the performance of surgical operations, which is due to an English surgeon, Sir Joseph Lister, who brought it into notice in 1867–68. Antiseptics of various kinds had been proposed and used by others prior to this date. Küchenmeister of Dresden had reported good results from the use of carbolic acid in 1860; Lemaire's work on carbolic acid appeared in 1863; Campbell de Morgan used chloride of zinc in 1866; but it was Mr. Lister who established the method on the basis of Pasteur's experiments showing that putrefaction is due to the action of micro-organisms, and who systematically sought for, and found, means to prevent the access of these micro-organisms to wounds or to destroy their

vitality if they had already gained admission, and to do this with the least possible injury to the living tissues. The actual cautery and the boiling oil of the surgeons of the fifteenth and prior centuries were antiseptic, no doubt, as were also some of the multifarious wound-dressings in use since the days of Hippocrates; but antiseptic surgery began with Mr. Lister, and its progress has been largely due to the scientific manner in which he developed and expounded it. With the introduction of Koch's method of cultures on solid or semi-solid media, which is the foundation of the new bacteriology, has come a knowledge of the mode of development and of the results of the growth of some of these organisms which has already revolutionized operative surgery, and made obsolete and comparatively useless a vast amount of surgical literature and statistics. An illustration of this is given in a comparison of the results obtained by Liston in 1844 with those obtained in the University College Hospital forty years later, contained in an address on surgery by John Marshall in the *British Medical Journal* (August 8, 1885, p. 235). He concludes that "injuries not involving a breach of the surface of the body, simple inflammations consecutive to these, or so-called idiopathic local inflammations which come under the care of the surgeon, such as sprains, simple dislocations, synovitis, orchitis, and other cases, were not less satisfactorily treated in 1844–45 than in 1883, and the progress of the patients toward recovery was quite as rapid, but that in cases of wounds and operations the difference in favor of the latter period is very striking."

After the abolition of the medical faculties and societies in France by the decrees of 1792 and 1793 the evil results of want of means for giving proper medical instruction soon became evident from the fact that properly-qualified medical officers could not be found to supply the places of those who died in the service of the armies of the Republic. By direction of the National Convention a report was prepared by the celebrated chemist, Fourcroy, on the best plan of organizing medical schools to meet this want, and in accordance with this report a law was passed in 1794 establishing medical schools at Paris, Montpellier, and Strasburg. The method taken to secure students was peculiar and effectual. From each district in France a young man between seventeen and twenty-six years of age, whose name had not been drawn in the first conscription, was selected by the governmental authorities and forwarded at the expense of the State to one of these schools, three hundred being assigned to Paris, one hundred and fifty to Montpellier, and one hundred to Strasburg. Three years was the period of instruction allowed, and as soon as they were considered qualified they were sent to join the troops. These were really military medical schools analogous to that established at Berlin. They did not confer the doctor's degree, the object being simply to manufacture medical officers as soon as possible.

After several changes the Paris school was definitely organized in 1804, and became a medical society as well as a teaching body, the object of the government being to obtain not only a medical faculty, but a scientific body which should be capable of giving advice to the government. The society part of this arrangement was dissolved in 1821 by the formation of the Academy of Medicine.

In 1806 the Imperial University was created, and in 1808 the medical school became its faculty of medicine. In 1822, owing to political troubles, the Faculty of Medicine was suppressed, but it was re-established in 1823 with a change in a number of the professors, A. Dubois and Pelletan losing their chairs.

In 1830 the Faculty of Medicine was again reorganized, the acts of 1822 and 1823 being abolished and the old professors being again placed in their chairs, while at the same time the concours was again established as a means of filling the professorships. Jules Rochard, in his *Histoire de la chirurgie française au xix^e^ siècle* (Paris, 1875), gives the most complete and satisfactory account of French surgery of the century, and his division of it into four periods will be followed in this sketch.

At the beginning of the century the leading surgeons in Paris were Sabatier, Deschamps, Lassus, Boyer, Dubois, Pelletan, and Lallement. Sabatier and Deschamps have already been referred to in speaking of French surgeons in the latter part of the eighteenth century.

Pierre Lassus (1741–1807), professor of surgery in the École de Santé and consulting surgeon of Napoleon I., was a learned surgeon who was the author of a good history of anatomy, of a manual of operative surgery (2 vols., Paris, 1794), and of *Pathologie chirurgicale* (2 vols., Paris, 1805–06).

Alexis Boyer (1757–1833) was a pupil of Desault and surgeon of the Charité, a modest, quiet, studious, hard-working man, without much originality or brilliancy either in his clinical work or his lectures and writings, but a careful compiler and a thoroughly reliable teacher. His *Traité des maladies chirurgicales* (11 vols., 1814–26) is a practical system of surgery, the most complete of its kind then in existence, and for many years it remained the highest authority in this branch of medical literature. His chief contributions to practical surgery were his descriptions of the painful crepitation of tendons, of translucency of the tumor as diagnostic in hydrocele, of bleeding fungous tumors, and of the complications of fissure of the anus. His system is characterized by Malgaigne as a summary of the works and opinions of the French Academy of Surgery, which is no doubt correct. It is a résumé of French surgery which he gives, and he has little or nothing to say of the surgery of Germany, of England, or of America.

Antoine Dubois (1756–1837), a pupil of Desault, professor of anatomy in the École de Santé, was a skilful surgeon and a good clinical teacher, but wrote nothing of importance.

Philippe Jean Pelletan (1747–1829), a pupil of Louis and of Sabatier, succeeded Desault as chief surgeon at the Hôtel Dieu, became professor of clinical surgery at the founding of the Medical Faculty of Paris, and consulting surgeon to the emperor. In 1815 he was professor of operative surgery, and retired from practice in 1823. He was an eloquent lecturer, but made no valuable contributions to the art. His *Clinique chirurgicale* (3 vols.) was published in 1810–11.

André Marie Lallement (1750–1830), a pupil of Desault, was surgeon to the Salpêtrière and professor of surgery in the Medical Faculty. He wrote only a few papers for periodicals.

To these should be added the names of Larrey, Percy, Dufouart, and Saucerotte.

Dominique Jean Larrey (1766–1842), the most distinguished military surgeon at the end of the last and the beginning of the present century, served in the Napoleonic campaigns, and was professor in the military school founded in 1796 at Val-de-Grâce. His chief writings are his *Mémoires de médecine militaire et campagnes* (4 vols., Paris, 1812–17) and his *Recueil de mémoires de chirurgie* (Paris, 1821).

Pierre François Percy (1754–1825) was professor in the military medical school in 1820. At his suggestion a battalion of litter-bearers, or a hospital corps, was created in the Italian war.

To the second period (1814–35) belong Dupuytren, Richerand, Roux, Marjolin, Lisfranc, Sanson, and Jules Cloquet.

Guillaume Dupuytren (1778–1835) at the age of eighteen obtained by concours a position as prosector in the Academy, in 1801 became chief of the department, in 1808 obtained a place on the surgical staff of the Hôtel Dieu, in 1812 was appointed to the chair of operative surgery, and in 1815 became surgeon-in-chief to the Hôtel Dieu. For the next fifteen years he was the most distinguished surgeon in France—and, for that matter, in the world, as the fame of his clinical teaching drew crowds of students from all countries. His studies in pathological anatomy and in experimental physiology contributed greatly to his success, which turned largely on his unequalled powers of diagnosis.

He was not a student of books, and wrote but little, and that little is not remarkable. He made no great discoveries, his chief contributions to the art being his method of treating artificial anus by means of his compressing enterotome, his excisions of the jaws, and the subcutaneous section of the sterno-mastoid. He was a cold, reserved, unscrupulous, and ambitious man, with contemptuous and offensive manners, who can hardly be said to have had any personal friends; but he was an incessant worker, thoroughly self-reliant, a bold operator, and unsurpassed as a clinical teacher in the precision, method, and clearness with which he stated all the salient points of the case on hand. His clinical lectures were noted and published by Brierre de Boismont and Buet in 1832–34 in 4 volumes; a second edition, in 6 volumes, appeared in 1839. Those portions of these lectures which relate to injuries and diseases of the bones were translated by F. Le Gros Clark and published by the Sydenham Society in 1847; and other selections, under the title of *On lesions of the vascular system, diseases of the rectum, etc.*, by the same translator, form a volume of the Sydenham Society's publications issued in 1854.

Balthasar Anthelme Richerand (1779–1840) published his *Nosographie chirurgicale* (1805–06, 3 vols.; 5th ed. in 1821, 4 vols.). He was appointed professor of surgical pathology in the faculty by Napoleon in 1807. He was more successful as a writer than he was as an operator or teacher, but he had nothing of the impartial spirit of the true critic, and the man whom he praised one year he would denounce the next. He made no special contributions to surgery with the exception of a case of resection of the fifth and sixth ribs on the left side, being the first instance in which such an operation had been performed to this extent.

Philibert Joseph Roux (1780–1854) was a student and warm personal friend of Bichat, whom he succeeded as a teacher. He became surgeon at the Charité in 1810, professor of surgery in the faculty in 1820, and succeeded Dupuytren at the Hôtel Dieu in 1835. He first became celebrated by the publication, in 1815, of his *Relation d'un voyage fait à Londres en 1814; ou parallèle de la chirurgie angloise avec la chirurgie françoise*—a book which had considerable influence in diffusing in each country a knowledge of what had been done in the other, in spite of the crude and superficial views on many points which it presented. His most important contributions to the art were in plastic surgery, particularly in staphylorrhaphy, which he first performed in 1819, and in suture of the ruptured perineum, which he first performed in 1832. He gave the first distinct course of lectures on surgical anatomy in 1812. His most important literary work was his *Quarante années de pratique chirurgicale*, of which but two volumes were published, the first, relating to plastic surgery, appearing in 1854, and the second, on diseases of the arteries, in 1855.

Jean Nicolas Marjolin (1780–1850) was prosector of anatomy in 1806, and in 1816 became second surgeon of the Hôtel Dieu, but soon retired to avoid unpleasant association with Dupuytren. In 1819 he became professor of surgical pathology. He was a good surgeon and extremely popular as a teacher, but was not distinguished as an operator. His name remains connected with the form of malignant degeneration of chronic ulcer of the leg known as the "warty ulcer of Marjolin."

Jacques Lisfranc (1790–1847) studied at Lyons and Paris and graduated in 1813, after which he served for a short time in the army and then settled in Paris. In 1825 he became second surgeon at La Pitié, and a short time afterward, on the death of Béclard, he became the chief surgeon at this hospital. He sought to reduce operative surgery to mathematical rules, and his name is connected with methods of partial amputation of the foot, of amputation at the wrist, the shoulder-joint, and the hip, and with methods of resection of the head of the humerus, for removal of the lower jaw, for excision of the rectum, and for amputation of the neck of the uterus. He was an excellent operator and clinical teacher, but envious of the greater success of some of his contemporaries, particularly Dupuytren and Velpeau, and died dissatisfied with himself and with every one around him. His principal publications are—*Clinique chirurgicale de l'hôpital de la Pitié* (3 vols. 8vo, Paris, 1841–43) and *Précis de médecine opératoire* (3 vols. 8vo, Paris, 1845–48).

Louis Joseph Sanson (1790–1841) was a pupil and friend of Dupuytren. After serving in the army from 1812 to 1815, he returned to Paris, and in 1825 became the second surgeon of the Hôtel Dieu. In 1836 he succeeded Dupuytren as professor of clinical surgery, winning the place by concours. The first forty years of his life were a continued struggle with poverty, and his subordination to Dupuytren prevented him from obtaining the reputation to which his skill as a diagnostician and operator entitled him. His principal work was the *Nouveaux éléments de pathologie médico-chirurgicale, par Roche et Sanson* (4 vols., 1824; 3d ed. 1833), of which he wrote all the surgical part.

Jules Germain Cloquet (1790–1883) came to Paris in 1810 and became preparer for the museum of the School of Medicine. He published a valuable series of anatomical observations on hernia in 1817, and a magnificent work on human anatomy, containing a large number of plates, which is still classic; in 1831 he became professor of surgical pathology, and succeeded Dubois in the chair of clinical surgery in 1833, which

position he retained until 1850. He contributed a large number of papers on anatomical and surgical subjects to the journals, and devised a number of new instruments.

Joseph Souberbielle (1754–1846) studied at Paris under Desault and entered the army. He took his degree in 1813, after which he remained in Paris, devoting himself chiefly to lithotomy, and especially to the suprapubic method. He was a relative of Frère Côme and of his nephew Baseilhac, and inherited their instruments and reputation. He is said to have performed the suprapubic operation over twelve hundred times.

To this period belongs the introduction of lithotrity, with which are especially connected the names of Civiale, Leroy (d'Étiolles), and Heurteloup.

Jean Civiale (1792–1867) studied at Paris, graduating in 1820, and made a specialty of the diseases of the urinary organs, and especially of lithotrity, which he successfully performed on a living human subject in January, 1824. In 1828 a special section for those afflicted with calculus was set apart for him in the Hospital Necker, and his practice became enormous. He had much mechanical ingenuity and dexterity, but he was neither a speaker nor a writer, and the greater part of the numerous publications which appeared under his name were really written by Jourdan, Boisseau, Bégin, and others. In his first book, *Nouvelles considérations sur la rétention d'urine, etc.* (1823, p. 115), he referred to a report of Pouteau that "haricots blancs" had passed from the stomach into the urinary bladder, etc., and said: "Si les faits rapportés sont exacts, ces corps suivent-ils le torrent de la circulation?" Some kind friend pointed out the blunder to him before the edition was put on the market, and he cancelled the greater part, but a few had been sent out as presentation copies, and these are now regarded as curiosities in medical literature.

Jean Jacques Joseph Leroy (d'Étiolles) (1798–1860) studied at Paris, graduating in 1824, prior to which he had devised a three-pronged instrument for seizing and perforating a stone in the bladder, and his whole life was mainly devoted to this branch of surgery and to bitter contests as to priority of invention. He was not, however, a pure specialist, and was a much more scientific man than Civiale. The list of his publications is a long one, but they are comparatively brief papers.

Charles Louis Stanislaus Heurteloup (1793–1864), son of Baron Nicolas Heurteloup, a distinguished French army surgeon, studied in Paris, graduating in 1823, and almost immediately turned his attention to the subject of lithotripsy and to criticism of the work of Civiale and Leroy (d'Étiolles). He greatly improved the instruments used in lithotripsy, and is said to have spent one hundred and fifty thousand francs in perfecting his inventions. From 1828 to 1832 he was in London, and published there his *Principles of Lithotrity* (1831).

To this period also belong Delpech and Lallemand of Montpellier.

Jacques Mathieu Delpech (1777–1832), a native of Toulouse, graduated at Montpellier in 1801, after which he studied in Paris. In 1812 he obtained, by concours, the chair of surgery at Montpellier, and soon became celebrated as an operator and as a clinical teacher. In the height

of his fame he was assassinated by a patient whom he had treated for some disease of the genitals. His principal contributions to surgery relate to hospital gangrene and to orthopædia. He first pointed out that tubercular disease of the vertebræ was the frequent origin of Pott's disease of the spine, insisted on the importance of the fibrous tissues in connection with deformities, and in 1816 performed subcutaneous section of the tendo Achillis with the avowed intention of thus excluding the air and obtaining union by first intention. The successor of Delpech in the chair of clinical surgery was Michel Serre (1799–1849), who graduated at Montpellier in 1825, and who published his *Traité de la réunion immédiate, etc.*, in 1830, and his *Traité sur l'art de restaurer les difformités de la face, etc.*, in 1842.

Claude François Lallemand (1790–1853), a native of Metz, studied at the Military Medical School of that place, and at the age of thirteen entered the army medical service. In 1811 he went to Paris and became an assistant to Dupuytren; in 1819 he was appointed professor of clinical surgery at Montpellier; and after the death of Delpech he was the chief surgeon in the south of France. In 1823 he lost his place for ten months through clerical intrigues, but was replaced by the Council of Public Instruction. He is best known as the author of *Des pertes séminales involontaires* (3 vols., 1836–42), of which several English translations were published. He devised the method of autoplasty by bending without twisting the flap, and the method of treating erectile tumors by the insertion of needles.

In the third period (1835–47) come Gerdy, Velpeau, Blandin, A. Bérard, Laugier, Jobert, Amussat, and Vidal.

Pierre Nicolas Gerdy (1797–1856) studied in Paris under the most adverse circumstances of poverty and sickness, and in 1828 became second surgeon to La Pitié, where he was under the orders of Lisfranc, who gave him very few opportunities. In 1831 the surgeons of the hospitals were placed on an equal footing, the position of surgeon-in-chief being abolished. In 1833, as the result of an intrigue of Dupuytren to suppress Velpeau, Gerdy became professor of the principles of surgery in the faculty, and in 1839 was appointed surgeon to La Charité, taking the place of Guerbois. The list of Gerdy's works is a long one, but he was a physiologist rather than a surgeon, and his most important surgical publication was his *Traité des bandages et des pansements* (2 vols., 1837–39).

Alfred Armand Louis Marie Velpeau (1795–1867), the son of a blacksmith, whose trade he learned, studied at Tours, where he received the diploma of *officier de santé*, and in 1820 came to Paris, and soon became assistant preparer for Cloquet. He graduated in 1823, and published his *Traité d'anatomie chirurgicale*, the first complete and systematic work in which the details of regional anatomy were throughout considered with reference to their surgical relations. In 1828 he became surgeon to the Hospital St. Antoine, and in 1830 to La Pitié, where he remained until 1834, when he was elected to the chair of clinical surgery in the faculty left vacant by the death of Boyer. In 1832 he published his *Nouveaux éléments de médecine opératoire* (3 vols. and atlas), the largest and most complete work on this subject which had yet appeared. The English translation of this by Townsend, with notes

of Valentine Mott (New York, 1847), and especially the latest edition, with additions by G. C. Blackman (New York, 1856, 3 vols. and atlas), is a great storehouse of historical data relating to the principal operations of surgery up to that date. In 1854 he published his *Traité des maladies du sein*, a large book, characterized by Trélat as the most original, personal, and probably the most durable of his works, and which must not be confounded with his *Petit traité des maladies du sein*, published in 1838 as a reprint of his article in the *Dictionnaire de médecine*, and which was translated into English by Parkman in 1840. He made no great discoveries or improvements, yet he contributed greatly to the progress of surgery between 1825 and 1855, and especially in surgical anatomy, the pathology of pyæmia, the diagnosis of tumors, and the diseases of the breast. A man of strong common sense, an indefatigable worker, a conscientious and conservative critic, an excellent teacher and operator, his lessons were followed by crowds of pupils, including many who became distinguished surgeons in other countries as well as in France.

Philipp Fréderic Blandin (1798–1849) graduated at Paris in 1824, in 1828 became a surgeon to the Hospital Beaujon under Marjolin, and in 1841 succeeded Richerand in the chair of operative surgery. He also became surgeon to the Hôtel Dieu. Blandin was not a great surgeon nor a great teacher, and there is little in his writings which is of interest at the present day, but he was a sensible, practical, honest man who did good work in his time.

Auguste Bérard (1802–46) studied at Paris, graduating in 1829, became a surgeon of the Central Bureau by concours in 1831, and, subsequently, surgeon to the hospitals St. Antoine, Salpêtrière, Necker, and La Pitié, and in 1842 succeeded Sanson as professor of clinical surgery in the faculty. The student part of his life was one of great poverty, shared by his brother, P. Bérard, who devoted himself to physiology. A. Bérard wrote some excellent concours theses, many articles in the *Dictionnaire de médecine*, and began, with Denonvilliers, a *Compendium de chirurgie pratique*, of which only a portion was issued at his death. His contributions to surgery relate to the treatment of fractures, continuous irrigation of wounds, erectile tumors and varices, staphylorrhaphy, etc. He was a skilful operator and an excellent teacher.

Stanislaus Laugier (1799–1872), a pupil of Dupuytren, graduated at Paris in 1828, became surgeon to the Hospital Necker in 1832, to the Hospital Beaujon in 1836, professor of clinical surgery in the faculty in 1848, and surgeon to the Hôtel Dieu in 1854, succeeding Roux. He first called attention to the discharge of serous fluid from the ear in certain fractures of the skull, and was the first to propose suture of divided nerves. He was a prudent, quiet, conservative surgeon and a good teacher, but he wrote little and his name is now almost forgotten.

Antoine Joseph Jobert (1799–1867) studied at Paris, graduated in 1828, was appointed a surgeon of the Central Bureau by concours in 1829, and surgeon to the Hospital St. Louis in 1831. In 1853 he became surgeon to the Hôtel Dieu, and in 1854 succeeded Roux as professor in the faculty. His childhood and student-life were spent in great poverty, at times in actual destitution; his subsequent life was a very unhappy one, in spite of the honors and wealth to which he attained;

he became gloomy and eccentric, and ended his days in an asylum for the insane. Lacking in preliminary education and in oratorical gifts, his success was due to the novelty and importance of his contributions to plastic surgery and to the surgery of the female organs of generation. He was a better writer than speaker, and wrote much; his *Mémoire sur les plaies du canal intestinal*, published in 1826, before his graduation, was based upon the experimental method of Hunter, and demonstrated the importance of producing union between the serous surfaces. His most important works were—*Traité de chirurgie plastique* (2 vols. and atlas, 1849), *Traité des fistules vésico-utérines, etc.* (1852), and *De la réunion en chirurgie* (1864).

Jean Zulema Amussat (1796–1856), the son of a country physician, entered the army medical service in 1814, after which he studied at Paris, graduating in 1826. He did not become a professor in the faculty or surgeon to a great hospital, but he commenced private teaching even before he graduated, and he communicated most of his discoveries to the Academy of Medicine, which granted him prizes for his contributions on lithotrity, on the torsion of arteries, on the entrance of air into the veins, on lumbar colotomy, etc. He wrote much, but his papers were never collected.

Auguste Théodor Vidal (de Cassis) (1803–56) studied at Marseilles and Paris, graduating in 1828, soon after which he became connected with the newly-founded *Gazette des hôpitaux*. He never became a professor or connected with a great surgical clinic, and, being a sarcastic journalist and rather bitter critic, he made few friends. His reputation as a surgeon rests upon his *Traité de pathologie externe* (5 vols., 1838–41), which was a popular manual and reached a fifth edition in 1860. He invented serres-fines, was the first to inject a solution of nitrate of silver into the uterine cavity, and contributed largely to our knowledge of syphilis, successfully opposing Ricord, the great authority of the day, in some important points relating to this disease.

Joseph Gensoul (1797–1858) studied at Lyons and Paris, graduating in 1824, and in 1826 became chief surgeon of the Hôtel Dieu of Lyons, where he soon acquired celebrity as a bold and skilful operator. He first (in 1826) excised the entire upper jaw, in 1827 he removed the parotid gland, and, first in France, excised half of the lower jaw, and he first treated varices with caustic. He wrote very little, his chief publication being his *Lettre chirurgicale sur quelques maladies graves du sinus maxillaire et de l'os maxillaire inférieur* (1833).

Amédée Bonnet (1802–58) studied at Paris, where he graduated in 1832, and in 1833 obtained the position of surgeon to the Hôtel Dieu at Lyons by concours, after which he became a professor in the school, and was soon celebrated as a teacher. His principal publications are—*Traité des sections tendineuses et musculaires dans la strabisme, la myopie, etc.* (1841), *Traité des maladies des articulations* (2 vols., 1845), and *Traité de thérapeutique des maladies articulaires* (1853), which latter remain as valuable contributions to the surgery of the joints.

Charles Gabriel Pravaz (1791–1853) studied at Paris, graduated in 1824, and devoted himself to orthopædic surgery, associating himself with Jules Guérin in a private orthopædic hospital. In 1835 he settled in Lyons. His principal contributions to surgery relate to orthopædia

—which he was one of the first to place on a scientific foundation—to the use of perchloride of iron, to the use of fine hollow needles for the injection of varices or erectile tumors, etc.

Raoul Henri Joseph Scoutettin (1799–1871), a native of Lille, entered the army, and graduated at Paris in 1822. He became one of the most distinguished of French military surgeons, was professor in the school at Metz in 1836, and in 1840 held the same position in the military hospital at Strasburg. In 1854 he was in charge of the military hospital in Constantinople and Pera, after which he returned to Metz, and was in charge of the military hospital until his death. He was a voluminous writer on matters connected with military medicine and surgery, and an excellent operator. He successfully performed tracheotomy on his infant daughter six weeks old.

Jean Baptiste Lucien Baudens (1804–57) studied in Paris, entered the army medical service in 1823, and graduated in 1829. He served in Africa from 1830 to 1837, in 1838 became professor in the hospital at Lille, and in 1842 professor at Val de Grâce. He was a distinguished military officer, and made numerous contributions to military surgery, among which may be mentioned his *Clinique des plaies d'armes à feu* (1836) and his *La guerre de Crimée, les campements, les abris, les ambulances, les hôpitaux, etc.*, first published in the *Revue des deux-mondes* in 1857, and in separate form in 1858.

Jean Gaspard Blaise Goyrand (1803–66) studied at Paris, graduated in 1828, and, returning to his native city Aix, became chief surgeon to the hospital, and one of the most distinguished of the French provincial surgeons of his day. He made important contributions to the literature of amputations, fractures of the lower end of the radius, operations for loose bodies in the joints, extirpation of the tongue, urethral fistula, etc. His principal work is his *Clinique chirurgicale; mémoires et observations de chirurgie, etc.* (Paris, 1870), published after his death by Dr. Silbert.

Jules Roux (1807–77), a native of Aix, studied at Toulon, entered the naval medical service in 1828, and became professor in the school of Toulon in 1842. He was distinguished as an operator and clinical teacher, devised a useful modification for disarticulation of the foot, made improvements in the operation of trephining, and was the first to make use of iodine injections in disease of the shoulder-joint. He made numerous contributions to the journals and learned societies, but published no important separate work.

To the fourth period (from 1847 to the present time) belong, in addition to those already referred to and those who are still living and do not yet belong to history, a number of well-known surgeons, of whom the most prominent at Paris were Malgaigne, Nélaton, Denonvilliers, Chassaignac, Richet, Follin, Broca, Dolbeau, Gosselin, and Trélat.

Joseph François Malgaigne (1806–65), a native of the Vosges, son of an *officier de santé*, studied at Paris, graduating in 1831, and after a short term of military service in Poland settled in Paris, where he became a surgeon of the Central Bureau in 1835, and began to teach surgical anatomy. He was successively surgeon to the Hospital St. Louis and to La Charité, and in 1850 won by concours the chair of operative surgery vacated by Blandin.

Malgaigne was the greatest surgical historian and critic which the world has yet seen, a brilliant speaker and writer, whose native genius, joined to incessant labor, brought about a new mode of judging of the merits of surgical procedures—the mode of statistical comparison joined to experiment. He was not a great operator, and although he made some improvement in the art, such as his hooks for the treatment of fractures of the patella, his suggestion of suprathyroid laryngotomy, etc., these are of small importance as compared with his work of exploding errors, exposing fallacies in reasoning, and bringing to bear upon the work of the present day the light of the experience of the past, of which his treatise on fractures and dislocations affords many excellent examples. The reports of his speeches in the Bulletins of the Academy of Medicine are among the most delightful reading in surgical literature.

Auguste Nélaton (1807–73), the son of a French soldier, a native of Paris, studied at the Hôtel Dieu under Dupuytren and at the Foundling Hospital, graduating in 1836. He became professor of clinical surgery in 1851, was for many years a colleague of Malgaigne at the Hospital St. Louis, and for the last fifteen years of his life was the most popular surgeon in Paris. He was, in fact, in many respects, the best surgeon whom France has produced during the century, being unsurpassed as a diagnostician, as an operator, and as a clinical teacher, and was a modest, quiet gentleman who attacked no one and befriended many. He made many improvements in surgical technique, among which was the porcelain-headed probe which he devised for demonstrating the presence of the bullet in Garibaldi's ankle-joint. He brought into French practice the principle, so strongly insisted on by Guthrie, of ligating both ends of a wounded artery within the wound for either primary or secondary hemorrhage, improved the methods of treatment of nasopharyngeal tumors, first clearly demonstrated retro-uterine hæmatocele, and brought ovariotomy into good repute in France. He wrote comparatively little, his chief publication being his *Éléments de pathologie chirurgicale* (5 vols., 1844–59, of which the last two volumes were published by A. Jamain). The only publication of his clinical lectures is that made in 1855 by Dr. W. F. Atlee of Philadelphia from his own notes—a book which is not nearly as well known as it deserves to be.

Charles Pierre Denonvilliers (1808–72) studied at Paris and graduated in 1837; became a surgeon of the Central Bureau in 1840, in 1842 chief of the School of Practical Anatomy and surgeon of the Hôtel Dieu, and in 1856 professor of surgery. He was, however, more of an anatomist than a surgeon, although he was a good operator, especially in the field of plastic surgery. His most important services to medicine were rendered in his capacity as inspector-general of public instruction for medicine, to which he was appointed in 1858.

Édouard Pierre Marie Chassaignac (1804–79) studied at Nantes and Paris, graduating in 1835, and gave private courses in anatomy and operative surgery, but did not become a professor in the faculty, although he often competed for this position. He became surgeon to the Lariboisière in 1852. His most important contributions to surgery were the introduction of the method of the drainage of wounds and abscesses, his method of dressing wounds by complete occlusion, and his invention of the écraseur.

Louis Alfred Richet (1816–91), a native of Dijon, studied in Paris, graduating in 1844. He was surgeon to the hospitals Lourcine, St. Antoine, and La Pitié, and in 1864 became professor of clinical surgery in the faculty. His principal work was his *Traité pratique d'anatomie médico-chirurgicale* (Paris, 1857; 4th ed. 1873).

Eugène Follin (1823–67), a pupil of Velpeau, was a skilled anatomist and excelled in diagnosis. He introduced the use of the ophthalmoscope in France. His early death left his *Traité élémentaire de pathologie externe* unfinished, but it was continued and completed in six volumes by Duplay, and is a work of much practical value. His contributions to surgery are characterized by freedom from exaggeration and by sound sense.

Paul Broca (1824–80), the son of an army surgeon, studied at Paris, graduating in 1849, immediately after which he became prosector at the École pratique. In 1853 he became assistant professor in the faculty, and in 1867 professor of surgery, soon after which he exchanged this chair for that of clinical surgery. He was successively surgeon to the hospitals St. Antoine, La Pitié, Des Cliniques, and Necker. He was an original investigator of a high order, as is shown by his researches on cerebral localization, aphasia, etc. Distinguished as an anatomist, a pathologist, and a surgeon, he devoted himself in the latter part of his life more especially to anthropology, of which he may almost be said to have been the founder in France. He was the first to trephine for an abscess of the brain, the location of which was determined by his study in the localization of function of that organ. In fact, his studies may be said to be the foundation of modern brain-surgery.

Henri Ferdinand Dolbeau (1830–77) studied at Paris, graduating in 1856, became hospital surgeon in 1858, serving successively at the Hospital for Children, Necker, and the Hôtel Dieu, where he replaced Jobert in 1865, and in 1868 became professor in the faculty. He contributed to our knowledge of club-foot, of cartilaginous tumors, of epispadias, and of spina bifida, suggested lithotrity through perineal section in cases of large calculus, and was an excellent practical teacher. His principal works are *De l'épispadias* (1861), *Traité pratique de la pierre dans la vessie* (1864), and *Leçons de clinique chirurgicale* (1867).

Athanase Léon Gosselin (1815–87), a native of Paris, graduated in 1843, and became surgeon to the hospitals, and in 1858 professor of surgery in the faculty, and surgeon to La Charité in 1867. He contributed to journals many valuable papers which were collected and published in his *Clinique chirurgicale de l'hôpital de la Charité* (2 vols., 1873; 3d. ed. 1879, and translated into English, Philadelphia, 1878).

Ulysse Trélat (1828–90), the son of a physician, and a native of Paris, studied at Paris, graduating in 1854. He became prosector in 1856, in 1857 assistant professor in surgery to the faculty, and in 1860 surgeon of the Central Bureau, serving successively at the hospitals Maternité, St. Antoine, St. Louis, La Pitié, and La Charité. He became professor of surgical pathology in the faculty in 1872. He was an eloquent speaker and fond of speaking, a very popular clinical teacher, and the first in France to recognize the importance of the new antiseptic method. His publications were mainly in journals and transactions; they relate chiefly to plastic surgery of the palate and of the face, to hernia, tuberculosis of the tongue, œsophagotomy, etc. His *Leçons de clinique chirurgicale* appeared in 1877, and his *Clinique chirurgicale* (2 vols.) in 1891.

In addition to these may be mentioned the following:

Joseph Pierre Eléonor Pétrequin (1809–76) studied at Paris, graduating in 1835, in 1838 became an assistant surgeon in the Hôtel Dieu at Lyons, and in 1855 became professor of surgery in the school. He was a learned historian in matters pertaining to the art, a skilled physician as well as surgeon, and a voluminous writer. His principal publications are—*Traité d'anatomie médico-chirurgicale et topographique* (1844; 2d ed. 1857, translated into German, 1845), *Clinique chirurgicale de l'Hôtel Dieu de Lyon* (1850), *Mélanges de chirurgie et de médecine* (1870, 1873, 1877), and *Chirurgie d'Hippocrate* (2 vols., 1878).

Joachim Albin Cardozo Cazado Giraldès (1807–75), a native of Portugal, studied at Paris and graduated in 1836. In 1848 he became a surgeon of the Central Bureau, and was appointed to the Children's Hospital. The results of his work in this hospital appear in his *Leçons cliniques sur les maladies chirurgicales des enfants, etc.* (1869).

Charles Emmanuel Sédillot (1804–83), a native of Paris, studied under Boyer and Roux, and in 1824 at the Val de Grâce. He graduated in 1829, after which he entered the military service, and in 1836 became professor of operative surgery at Val de Grâce. In 1841 he became professor of surgery at Strasburg by concours, succeeding Bégin. He made many valuable contributions to surgery, relating, among other things, to dislocations, plastic operations, urethrotomy, pyæmia, the surgery of the bones, gastrotomy—to which he gave the name—operations for cancer of the tongue, etc. In 1840 he performed the first successful amputation at the hip-joint in Paris.

Paul Louis Benoît Guersant (1800–70), son of a celebrated Paris physician, studied at Paris, graduated in 1828, and in 1833 became surgeon to the Children's Hospital by concours, remaining in this position until 1860. His principal work is his *Notices sur la chirurgie des enfants* (1864–67; translated into English, 1873).

Jules Réné Guérin (1801–86), a native of Boussu (at present in Belgium), studied at Paris, being a pupil of Boyer and Roux, and graduated in 1826. In 1830 he founded the *Gazette médicale de Paris*, of which he was the editor for forty years. He devoted himself to orthopædic surgery, having established a private orthopædic hospital, and in 1838 published his first memoir on deformities of the osseous system, which was followed by a long series of similar papers. A portion of these have been collected and published under the title *Œuvres du docteur Jules Guérin, etc.* (Paris, 1882), said to have been intended to fill 16 volumes, with 100 plates, but which has never been finished. As a controversialist and journalist he was better known and better liked among non-professional persons than among those of his own profession.

Félix Adolphe Richard (1822–72) studied at Paris, and graduated in 1848. He became surgeon of the Central Bureau in 1852, and assisted Nélaton in his clinical teaching. His principal work is his *Pratique journalière de la chirurgie* (1868).

When the Austrian Netherlands became a part of the French Re-

public, in 1795, the five medical schools in Belgium were suppressed, as those in France had been, and with much the same results. Each large town attempted to regulate the matter by local examinations and by the establishment of schools of an inferior class, mainly devoted to giving instruction in surgery and obstetrics to uneducated men. When the kingdom of the Netherlands was created in 1815 the Universities of Ghent and Liège were established and the old University of Louvain was rehabilitated. In organizing these schools a strong German element was introduced, and it was ordered that the lectures should be given in Latin. The result was a failure, for Paris was the great medical school of the day, and the Belgian students went there. The Revolution of 1830 closed the universities, and in 1835 medical teaching was placed substantially on the French basis.

The leading surgeons of Holland in this century have been Hendriksz, Onsenoort, Tilanus, and Ranke.

Pieter Hendriksz (1779–1845) served in the army, studied at Gröningen, where he began to teach surgery in the hospital in 1810, in 1827 was called to Leyden, and in 1828 to Amsterdam as professor, which position he resigned in 1832. He published descriptions of his operations in the Gröningen hospital in 1816, in 1822, and in 1828.

Anthony Gerard van Onsenoort (1782–1841), a surgeon's apprentice, served in the army, began to teach in Löwen in 1817, and in 1822 continued teaching in Utrecht. He published *De militaire chirurgie* (1832) and *De operative heelkunde* (3 vols., 1835–37), besides several works on ophthalmology.

Christian Bernard Tilanus (1796–1883), a native of Harderwijk, studied at Utrecht, graduating in 1819, and then in Paris under Dupuytren and Lisfranc, and in 1828 became professor of surgery and obstetrics in the school at Amsterdam, where he was the first to give regular clinical teaching in surgery in the hospital. He ceased teaching in 1872.

Hans Rudolph Ranke (1849–87), a native of Kaiserwerth and a pupil of Volkmann, graduated at Halle in 1874, and in 1876 became professor of surgery at Gröningen. He contributed a number of papers to journals, but published no important work.

At the beginning of the nineteenth century the leading Italian surgeons were Scarpa, Palletta, Monteggia, and Vacca Berlinghieri.

Antonius Scarpa (1752–1832) studied at Padua under Morgagni, graduating in 1770 at the age of eighteen. Two years later he was appointed professor of anatomy and theoretical surgery at the University of Modena, and in 1783 was appointed by Joseph II., emperor of Austria, as professor of anatomy at the University of Pavia, to which was added in 1787 the chair of clinical surgery. He retained both these professorships until 1803, when he gave up anatomical teaching, but continued to teach in clinical surgery until 1812. He was the most celebrated Italian anatomist and surgeon of his day, and his talent as an artist enabled him to illustrate his discoveries in a manner which at once attracted general attention. His name is perpetuated in surgery by "Scarpa's triangle."

Giovanni Battista Palletta (1747–1832) graduated at Padua in 1769, and in 1787 became chief surgeon of the Hospital Maggiore in Milan,

and gave lessons in anatomy and clinical surgery. He was greatly beloved, and his death was considered as a public calamity in Milan.

Giovanni Battista Monteggia (1762–1815) became professor of anatomy and surgery in Milan in 1795, and was associated with Scarpa in the preparation of *Istituzioni di chirurgia* (5 vols., 1802–03; 4th ed., 7 vols., 1829–30).

Andrea Vacca Berlinghieri (1772–1826), son of Francesco Vacca Berlinghieri, professor of medicine at Pisa, studied at Paris under Desault and at London under John Hunter, and, returning to Pisa, graduated in 1791. In 1801 he became professor of surgery at Pisa, and soon acquired a great reputation.

In the middle of the century the best-known Italian surgeons were—Luigi Porta (1800–75), who studied at Pavia, was for three years in Vienna, and became professor of clinical surgery at Pavia in 1832, which position he held until his death; and Francesco Rizzoli (1809–80), professor of surgery and obstetrics in Bologna in 1840, who was distinguished as an operator and teacher.

The scheme of medical studies adopted in Austria in 1810 prescribed a five years' course in medicine or the higher surgery, and a two years' course for country doctors. In 1822 the course at the Military Medico-chirurgical Academy, or Josephinum, was extended to five years, and this college had the right to grant degrees. In 1849 much more power was given to the professors in the various universities as to the arrangement of studies, but a complete separation between the faculties and the medical associations was not made until 1873. In 1872 separate diplomas for surgery were abolished.

In Prussia a system of medical study was arranged in 1825. It provided for physicians who studied at the universities, and for what were called surgeons of the first and second class. The surgeons of the second class were surgeons' apprentices who served for a short time in a military hospital or attended a few lectures at a medico-chirurgical college; their examination was a very easy one, but demanded some knowledge of anatomy, and they were mostly comparatively uneducated men of an inferior class. The surgeons of the first class had to study at a university or a medico-chirurgical school for three years, and were not required to know Latin, as were the physicians, showing that surgery was still considered inferior to medicine. In 1852 it was ordered that there should be but one class of doctors, but the obtaining a medical degree did not give the right to practise. At present the education and the standing of physicians and of surgeons are the same throughout the empire.

During the first fourteen years of the nineteenth century the Napoleonic wars produced an urgent demand for army surgeons, especially in Austria, which was often the field of conflict. Vienna had the leading surgical schools in Germany at that time, founded by Leber in connection with the university, and by Brambilla in connection with the Military Medical School, and the principal surgeons in Southern Germany after Leber were von Kern, Rudtorffer, Wattmann, and Zang.

Vincenz Sebastian von Kern (1760–1829), professor of surgery at Laibach in 1797, became professor of practical and clinical surgery in the Vienna University in 1805, and exercised a powerful influence on

the development of surgery and surgical teaching in Germany and Northern Italy until his resignation in 1824. He greatly simplified the prevailing treatment of wounds, returning to the water-dressings of Magatus and rejecting plasters and salves, and was a skilful operator and an excellent teacher.

Franz Xav. Rudtorffer (1760–1833) commenced teaching in the great Vienna Hospital in 1801, and in 1810 succeeded Leber as professor of surgery, which position he held until he retired in 1821.

Joseph von Wattmann (1779–1866), son of a surgeon and pupil of von Kern, became professor at Laibach in 1816, at Innsbruck in 1818, and at Vienna in 1824, retiring in 1848. He was a celebrated operator, and gained great reputation as a teacher.

Christoph B. Zang (1772–1835) graduated at Vienna, entered the Austrian army, and in 1806 became professor of surgery in the Josephinum. He published *Darstellung blutiger heilkünstlerischer Operationen* (4to, 1813–21)—an excellent manual of operative surgery, which reached a third edition and was translated into Italian.

In North Germany the principal surgeons of this period were Mursinna, Rust, C. J. M. Langenbeck, v. Walther, Hesselbach, and Brünninghausen.

Christian Ludwig Mursinna (1744–1823), a barber's apprentice, entered the Prussian army in 1761 under Theden. In 1787 he became surgeon-general, and professor of surgery in the military medical school at Berlin, which position, in connection with that of surgeon to the Charite, he retained after his retirement from military service in 1809. He was a skilful operator and a good administrator, who greatly improved the medical service in the Prussian army, but wrote little except occasional addresses and papers for journals.

Joh. Nepomuk Rust (1775–1840) studied in Vienna and Prague, and became professor of surgery at Cracow in 1803. From 1810 to 1815 he was one of the surgeons of the General Hospital in Vienna, and in 1816 he succeeded Mursinna in the army medical school at Berlin, becoming professor in the University of Berlin in 1824.

Conrad Joh. M. Langenbeck (1776–1851) studied at Jena, Vienna, and Würzburg, and in 1802 settled in Göttingen, where he soon began to teach anatomy and surgery. In 1814 he became professor of anatomy and surgery and surgeon-general of the Hanoverian army. In 1802 he published a treatise on lithotomy; in 1806 the first volume of his *Bibliothek für die Chirurgie*, of which the eighth and last volume appeared in 1828; and in 1822 the first volume of his *Nosologie und Therapie der chirurgischen Krankheiten, etc.*, of which vol. v. appeared in 1850. He was a skilful anatomist and operator, modifying and improving the technique, and a celebrated teacher.

Philip Franz v. Walther (1782–1849) was educated at Heidelberg and Vienna, and became professor and surgeon to the hospital at Bamberg when he was only twenty-one years old. In 1804 he became professor of physiology and surgery at Landshut, and soon acquired a high reputation as an operator and teacher. In 1818 he accepted a call to the newly-organized university at Bonn, where he soon became the leading German surgeon of his time. In 1830 he went to Munich as professor of surgery in the university, which had been transferred to that city

from Landshut, and as director of the surgical clinic in the General Hospital, in which positions he remained until his death. He was the founder of modern surgery in Bavaria, and his physiological training was of great assistance in his surgical teaching. He wrote a *System der Chirurgie* (1833) and numerous papers for periodicals.

Franz Caspar Hesselbach (1759–1816) was a pupil of Von Siebold at Würzburg, and his assistant in anatomical demonstrations. His principal contributions to surgery are his papers on hernia, published in 1806, 1814, and 1815, in the first of which he gives the first distinct description of the two forms of inguinal hernia.

Hermann Joseph Brünninghausen (1761–1834) was professor of surgery at Würzburg in the early part of the century, and published his *Erfahrungen und Bemerkungen über die Amputation* in 1818.

Between 1825 and 1850 the leading German surgeons were Graefe, Dieffenbach, and Chelius, in addition to the survivors of those already referred to.

Carl Ferdinand von Graefe (1787–1840) studied at Dresden, Halle, and Leipzig, in 1810 became professor and director of the surgical clinic in the newly-founded University of Berlin, and from 1813 to 1815 served as surgeon-general of division in the army. In 1816 he first performed suture for congenital cleft palate, and then devised blepharoplasty and rhinoplasty, which he introduced to notice. He was one of the first to resect a portion of the lower jaw, and the first in Germany to ligate the innominate artery.

Johann Friedrich Dieffenbach (1792–1847) was a native of Königsberg, where he studied from 1818 to 1820, when he went to Bonn and became the pupil of von Walther. In 1821 he went to Paris and Montpellier, attending the clinics of Dupuytren and Delpech, and in 1822 graduated at Würzburg, his thesis, *Nonnulla de regeneratione et transplantatione*, indicating the trend of his studies. In 1823 he went to Berlin and devoted himself largely to plastic surgery. In 1829 he became surgeon to the Charité, and in 1832 professor extraordinary in the university, at which time he began his work in orthopædic surgery. In 1829 he devised the section of the tendons of the ocular muscles for strabismus, which made a great sensation in the surgical world. In 1840, after the death of von Graefe, he became professor in the university and director of the surgical clinic. He made many valuable contributions to methods in plastic surgery and tenotomy, which are summed up in his *Operative Chirurgie* (2 vols., 1845–48). His enthusiasm for novelties led him into some blunders, as in his publications on the cure of stammering by subcutaneous section of the muscles of the tongue, but he was a great surgeon, a most skilful operator, and an extremely popular clinical teacher.

Max. Jos. von Chelius (1794–1876), a native of Mannheim, graduated at Heidelberg in 1812, after which he studied under Walther at Landshut and Vienna, and became professor at Heidelberg in 1819. Here he soon founded a surgical and ophthalmological clinic, and in 1822–23 published his *Handbuch der Chirurgie*, which for the next twenty-five years was the best-known manual in Germany, and indeed in Europe, having been translated into English, French, Italian, Danish, and Dutch, and the eighth German edition having been issued in 1857.

The English translation by South (in 1847) is especially valuable, being nearly doubled in size by the notes of the translator, and permitting of a direct comparison of the English and German surgery of that day. He was one of the best-known surgeons in Europe and had many distinguished pupils.

To this period also belong von Textor, Jaeger, Blasius, Wutzer, von Ammon, Wernher, Kuhl, Grossheim, Fricke, Mojsisovics, Holscher, and Benedict.

Kajetan von Textor (1782–1860) studied at Landshut under von Walther and graduated in 1808, after which he spent two years in Paris mainly following the teaching of Boyer, and a season at Pavia under Scarpa. In 1816 he became professor of surgery at Würzburg, and held this position until 1853 with the exception of the years 1832–33. He published *Grundzüge zur Lehre der chirurgischen Operationen, etc.*, in 1835, and some small monographs. His chief surgical contributions related to resections, in which he was a very skilful operator. His son Carl (1815–80) became assistant professor of surgery at Würzburg in 1850, and contributed a number of surgical papers to periodicals.

Michael Jaeger (1795–1838) graduated at Würzburg in 1819, and in 1826 succeeded Schreger as director of the surgical clinic at Erlangen, becoming professor of surgery in 1831. In 1832–33 he was professor of surgery at Würzburg during von Textor's absence, after which he returned to his old position at Erlangen. He contributed materially to the literature of resections and of diseases of the bones and joints.

Ernst Blasius (1802–75), a native of Berlin, studied at the Friedrich Wilhelm Institut and graduated in 1823, after which he served four years in the army, and then settled in Halle, where he became professor of surgery in 1834. His principal work was his *Handbuch der Akiurgie* (3 vols. and atlas, 1830–33), but he also published collections of cases and essays, a treatise on amputations, and numerous papers in the journals.

Carl Wilhelm Wutzer (1789–1863), a native of Berlin, studied at the Pépinière, served in the army, and became director of the surgical school at Münster in 1821. In 1830 he succeeded Weinhold as professor of surgery at Halle, and in 1833 took the same chair at Bonn. He contributed numerous articles to periodicals, but wrote no important works, and is best known as the originator of the method for the radical cure of inguinal hernia which bears his name. He was a skilled anatomist, a good operator, and a painstaking, careful teacher.

Friedrich August von Ammon (1799–1861) studied in Leipzig and Göttingen, graduating in 1821, and settled in Dresden, where he became professor in the surgical school in 1828, resigning in 1837. The greater part of his numerous publications relate to ophthalmology, but he also devoted much attention to plastic surgery and to orthopædia. In connection with Baumgarten he published *Die plastische Chirurgie nach ihren Leistungen kritisch dargestellt* (1842), and in the same year appeared his *Die angeborenen Krankheiten des Menschen, etc.* (in folio with plates), which is a classic. Another finely-illustrated work is his *Klinische Darstellung der Krankheiten und Bildungsfehler des menschlichen Auges, etc.* (fol., 1838–41).

Adolph Wernher (1809–83) graduated in 1832 at Giessen, where he became professor of surgery and director of the surgical clinic in 1837, retiring in 1878. His *Handbuch der allgemeinen und speciellen Chirurgie* (4 vols., 1846–47) was an excellent manual, of which the first volume of a second edition appeared in 1862–63.

Karl August Kuhl (1774–1840) studied at Leipzig, graduating in 1803, after which he went to Vienna, London, and Paris. In 1817 he became assistant professor, and in 1824 professor, of surgery at Leipzig. He was a bold and skilful operator, and ligated the innominate, the subclavian, and both carotids, all of which cases he described, but he wrote no important work and made no special contributions to surgical progress.

Ernst Leopold Grossheim (1799–1844), a pupil of the Friedrich Wilhelm Institut in Berlin, was an army surgeon and a teacher in the surgical school at Münster, who published a *Lehrbuch der operativen Chirurgie* (3 vols., 1830–35).

Joh. Carl George Fricke (1790–1841) studied at Göttingen, where he graduated in 1810, after which he studied in Berlin under von Graefe. In 1814 he settled in Hamburg and became surgeon of the General Hospital. He published the records of his clinical work in the *Annalen der chirurgischen Abtheilung des allg. Krankenhauses in Hamburg* (2 vols., 1828–33), and in various journals, especially in the *Zeitschrift f. d. ges. Medicin*, of which he was one of the editors. His contributions relate to blepharoplasty, the non-mercurial treatment of syphilis, the treatment of orchitis by compression, the torsion of arteries, the forceps and vaginal speculum known by his name, etc.

George Mojsisovics (1799–1860), a Hungarian, studied in Budapest and Vienna and graduated in 1826. In 1828 he became assistant in the surgical school at Vienna, and in 1832 first surgeon of the General Hospital. He published nothing of any importance.

George P. Holscher (1792–1852) studied at Göttingen, and in London under Astley Cooper, and settled in Hannover, where he became a teacher in the surgical school and editor of the *Hannoversche Annalen für die gesammte Heilkunde* (1836–47). His publications were almost entirely journal articles.

Traugott Wilh. Gustav Benedict (1785–1862) studied at Leipzig, graduating in 1810, and in 1812 became professor at Breslau, where he acquired a reputation as an ophthalmologist. His principal surgical publication is his *Lehrbuch der allgemeinen Chirurgie und Operationslehre* (1842).

The next group of German surgeons to be noted includes von Langenbeck, Stromeyer, Heyfelder, von Pitha, Schuh, von Bruns, Günther, Middledorpf, Busch, Linhart, Wagner, and Baum.

Bernard Rudolph Konrad von Langenbeck (1810–87), the most distinguished German surgeon of the nineteenth century, took his doctor's degree at Göttingen in 1835, became professor of surgery at Kiel in 1842, and succeeded Dieffenbach in the chair of surgery at Berlin in 1847. In conjunction with his pupils, Billroth and Gurlt, he established the *Archiv für klinische Chirurgie* in 1861, a journal which has contained the most important contributions to surgery made by German surgeons since that date, and he was the founder of the *Deutsche Gesellschaft für Chirurgie* in 1872. Langenbeck wrote no manual or system

of surgery, but contributed numerous papers to the *Archiv für klinische Chirurgie*, his largest work being his *Chirurgische Beobachtungen aus dem Kriege* (251 pp. 8vo, Berlin, 1874). His operations and improvements of the technical methods of surgical operations are too numerous to mention. Some of the most important of them relate to plastic surgery of the nose and of the hard palate, and to operations for tumors at the base of the cranium, for removal of the tongue, etc. His greatest contribution to surgery, however, has been his pupils, among whom may be numbered nearly every prominent surgeon in Germany of the present day.

Georg Friedrich Louis Stromeyer (1804–76), son of Chr. Fr. Stromeyer, surgeon to the king of Hannover, studied at Hannover, Göttingen, and Berlin, and graduated in 1826. In 1829 he began to teach in the surgical school at Hannover, in 1838 succeeded Jaeger as professor of surgery at Erlangen, in 1842 accepted the same chair in Freiburg, and in 1847 succeeded Langenbeck at Kiel. He became surgeon-general of the Schleswig-Holstein army, serving in the war of 1849, and surgeon-general of the Hannoverian army in 1854, serving in the war of 1866. His chief contributions to the art were connected with orthopædic surgery and tenotomy, and especially with resections in military surgery. He performed subcutaneous section of the tendo Achillis in 1831, being the first after Delpech to do so. His principal publications were *Beiträge zur operativen Orthopädik* (1838), *Handbuch der Chirurgie* (2 vols., 1844–48), and *Maximen der Kriegsheilkunst* (1855).

Johann Ferdinand Heyfelder (1798–1869), student at Berlin, Würzburg, and Breslau, graduating in 1820, in 1841 succeeded Stromeyer as professor of surgery at Erlangen, which position he resigned in 1854. The latter part of his life was spent in St. Petersburg. He was a learned surgeon, a skilful operator, a teacher of great reputation, and a voluminous writer upon many subjects besides surgery. He is best known by his treatise *Ueber Resectionen und Amputationen* (1854), which is a standard work upon the subject. His son, Oscar Heyfelder (1828–?), studied at Heidelberg and Erlangen, graduating in 1851, and entered the Russian army medical service in 1859. He published *Lehrbuch der Resectionen* (2d ed. 1863, and translated into French in the same year), *Kriegschirurgisches Vade Mecum* (1874), and numerous articles in the journals.

Franz von Pitha (1810–75), a native of Bohemia, studied at Prague, graduating in 1836, and in 1843 succeeded Fritz as professor of surgery in the University of Prague, in which position he soon obtained a high reputation as a teacher. In 1854 he accepted the chair of surgery in the Medico-chirurgical Josephs Academy in Vienna, re-established for the purpose of training medical officers for the Austrian army. His name is best known in connection with the *Handbuch der allgemeinen und speciellen Chirurgie*, edited by Billroth and himself (1865–82). He was a skilful diagnostician and operator and a cultured and polished gentleman.

Franz Schuh (1804–65) studied in Vienna, graduating in 1831, became surgeon to the General Hospital in Vienna in 1837, and professor of surgery in 1842. He was an excellent practical teacher and writer, aided much in increasing the reputation of the school, and contributed numerous papers to the journals. His principal books are—*Ueber die Erkenntniss der Pseudoplasmen* (1851), *Pathologie und Therapie der Pseudoplasmen* (1854), and *Abhandlungen aus dem Gebiete der Chirurgie und Operationslehre* (published after his death, in 1867).

Victor von Bruns (1812–83), student at Tübingen, graduating in 1836, became professor of surgery at Tübingen in 1843, which position he held until 1882. He was one of the founders of modern laryngology, and was the first to remove a laryngeal growth through the natural passages. His principal works are—*Chirurgischer Atlas* (fol., 1853–60), *Handbuch der praktischen Chirurgie* (2 vols., 1854–59), *Die Laryngoskopie und die laryngoskopische Chirurgie* (1865), *Chirurgische Heilmittellehre* (2 vols., 1868–73), *Die galvanokaustischen Apparate, etc.* (1878), and *Die Amputation der Gliedmassen durch Zirkelschnitt mit vorderem Hautlappen* (1879).

Gustav Biedermann Günther (1801–66) studied at Leipzig, graduating in 1824, and in the following year became an assistant to Fricke in the General Hospital at Hamburg. In 1831 he was appointed professor of surgery in Kiel, and in 1841 accepted the same position at Leipzig. He was a good anatomist and a careful, painstaking teacher, but was not distinguished as an operator. His principal work is his *Lehre von den blutigen Operationen am menschlichen Körper* (4to, 1859–65).

Albrecht Theodor Middeldorpf (1824–68) studied at Breslau and Berlin, graduating in 1846, and in 1856 became professor of surgery at Breslau. He introduced the use of the galvano-cautery, made improvements in the treatment of fractures and of gastric fistula, and was one of the best clinical teachers of his time. His principal publications are —*Beiträge sur Lehre von den Knochenbrüchen* (1853), *Die Galvanocaustik* (1854), *Ueberblick über die Akidopeirastik* (1856), and *Commentatio de fistulis ventriculi externis, etc.* (1859).

Carl David Wilhelm Busch (1826–81), son of the celebrated obstetrician Dietrich Wilh. Heinr. Busch, studied in Berlin, graduating in 1848, and after extensive travels became an assistant in Langenbeck's clinic in 1851. In 1854 he accepted a call to Bonn as professor of clinical surgery, and remained there until his death. He was a voluminous writer and made valuable contributions to the literature of gunshot wounds, fractures and dislocations, diseases of the joints, plastic surgery, and hernia, the majority appearing in periodicals and transactions. His *Lehrbuch der Chirurgie* (2 vols., 1857–69) was his principal work.

Wenzel von Linhart (1821–77), the son of a surgeon, studied in Vienna, graduating in 1844; became an assistant of Dumreicher, and in 1856 accepted a call to Würzburg as professor of clinical surgery. He was a skilled anatomist and operator and an excellent teacher. His principal works are his *Compendium der chirurgischen Operationslehre* (1856; 4th ed. 1874) and *Vorlesungen über Unterleibs-Hernien* (1866; new ed. 1882).

Carl Ernst Albrecht Wagner (1827–70), son of a celebrated physician, studied in Berlin, graduating in 1848; became an assistant in Langenbeck's clinic, surgeon to the hospital in Dantzig in 1853, and in 1858 professor of surgery in Königsberg, where he acquired great reputation as a teacher.

Wilhelm Baum (1799–1883) studied at Königsberg and Berlin,

graduating in 1822; continued his studies in Vienna, London, and Paris; in 1830 became surgeon in charge of the municipal hospital at Dantzig; in 1842 accepted the position of professor of surgery at Greifswald; and in 1849 took the same chair at Göttingen, from which he retired in 1867. He was a learned man and a good teacher, but published nothing.

To this period also belong Zeis, Stilling, and Heine.

Edward Zeis (1807–68), a native of Dresden, studied at Leipzig, Bonn, and Munich, graduating at Leipzig in 1832, after which he settled in Dresden. From 1844 to 1850 he was professor of surgery at Marburg, at the end of which period he returned to Dresden and became surgeon to the city hospital. His principal publications are—*Handbuch der plastischen Chirurgie* (1838) and *Die Literatur und Geschichte der plastischen Chirurgie* (1863–64).

Benedict Stilling (1810–79) studied at Marburg, graduating in 1833, and became assistant in the surgical clinic. Soon after he settled in Cassel, where he remained for the rest of his life. He is much better known as a physiologist and investigator of the nervous system than he is as a surgeon, but he was the first ovariotomist in Germany, and between 1856 and 1870 published several papers on stricture and on internal urethrotomy.

Jacob von Heine (1800–79), of a family of instrument-makers and orthopædists, student at Würzburg, graduated in 1827, and established an orthopædic hospital in Cannstatt which became celebrated. His principal publications are—*Beobachtungen über Lähmungszustände der untern Extremitäten und deren Behandlung* (1840), *Ueber spontane und congenitale Luxationen, etc.* (1842), and *Spinale Kinderlähmung* (1860).

Here also may be mentioned Carl Wilhelm von Heine (1838–77), son of Jacob v. Heine, and professor of clinical surgery in the new medical faculty of Innspruck in 1869, who wrote on gunshot wounds of the lower extremities, hospital gangrene, etc.; August Gustav Herrmann (1831–74) of Prague, author of *Compendium der Kriegs-Chirurgie* (1870); Fried. Wilh. Theodore Ravoth (1816–78) of Berlin, whose most important works relate to the treatment of hernia; Ernst Ludwig Schillbach (1825–?) of Jena, author of *Beiträge zu den Resectionen der Knochen* (1858–60); Hermann Demme (1802–67), professor of surgery in Berne, and his son, Carl Hermann Demme (1831–64), author of some valuable papers on military surgery; August Burow (1809–74) of Königsberg, a pupil of Dieffenbach, author of numerous papers on ophthalmology, the open treatment of wounds, and plastic surgery; Hermann Julius Paul (1824–77) of Breslau, author of *Die conservative Chirurgie* (1854; 2d ed. 1859) and *Lehrbuch der speciellen Chirurgie* (1861); Johann Balassa (1812–69) of Budapest, celebrated as an operator in lithotomy and plastic surgery; and Joseph Blazina (1812–85), who graduated in 1841 at Prague, where he became professor of surgery.

Between 1850 and the present time the leading surgeons of Germany, besides those already mentioned, and those who, being yet living, do not come within the scope of this paper, were Loeffler, Wilms, Simon, Thaden, Lücke, Hueter, Maas, Leisrink, Vogt, Volkmann, and Billroth.

Gottfried Friedrich Franz Loeffler (1815–74) studied at the Friedrich Wilhelm Institut in Berlin, and became one of the most distinguished of the German army surgeons. His principal works are—*Grundsätze und Regeln für die Behandlung der Schusswunden im Kriege* (1859) and *Das preussische Militär Sanitätswesen und seine Reform* (1868–69).

Robert Ferdinand Wilms (1824–80) studied at Berlin, graduating in 1846, and in 1848 became an assistant of Bartels in the Bethanien Hospital, of which he was placed in charge in 1862. He was one of the leading surgeons in Berlin, and was popular as a teacher, but wrote little beyond the reports of his hospital.

Johann Dumreicher (1815–80) graduated at Vienna in 1838, became assistant to Wattmann, and took charge of one of the surgical clinics in 1849. He wrote very little.

Christoph Jac. Fried. Ludw. Gustav Simon (1824–76) studied at Giessen and Heidelberg, graduating in 1848, and at once entered the Hessian army, in which he became medical director in 1861, in the same year was appointed to the chair of surgery at Rostock, and in 1867 accepted a call to the same position in Heidelberg. His first publication was *Ueber Schusswunden, etc.* (1851), soon after which, on a visit to Paris, he became acquainted with Jobert's method of operating for vesico-vaginal fistula, and on his return established a small hospital, acquired great reputation as an operator for such affections, and published a number of papers on the surgery of the female genitals. After going to Heidelberg he performed the first operation for nephrectomy in 1869, and published his *Chirurgie der Nieren* in 1871, the second part appearing after his death, in 1876. He was a bold and skilful surgeon, and made numerous improvements in methods of investigating and treating surgical affections. He was also a voluminous writer, but his publications were concise monographs, and not large, systematic treatises.

Adolf Georg Jacob von Thaden, a native of Holstein, studied in Heidelberg and Kiel, graduating in 1853, after which he was for two years an assistant of Esmarch, and in 1861 became surgeon of the new city hospital at Altona. He was a skilful, scientific surgeon.

George Albert Lücke (1827–94), a native of Magdeburg, studied at Heidelberg, Halle, and Göttingen. He became assistant to Blasius at Halle in 1854, and soon after became assistant to von Langenbeck in Berlin, and privatdocent. In 1865 he became professor of surgery at Berne, and in 1872 accepted the same position at Strasburg, where he remained until his death.

Carl Hueter (1838–82), son of a well-known obstetrician of Marburg, graduated in 1859, after which he studied in Vienna, London, and Paris, and became a privatdocent in Berlin and an assistant of Langenbeck. In 1868 he succeeded Simon as professor of surgery at Rostock, and in 1869 accepted a call to the same chair at Greifswald. Hueter was a scientific surgeon, giving great attention to pathology and bacteriology; he was also a skilful operator, made many improvements in method in resections, tracheotomy, excision of the rectum, etc., and was a voluminous writer. His principal works are—*Klinik der Gelenkkrankheiten* (1870–71; 2d ed. 1876–78), *Die allgemeine Chirurgie* (1873), and *Grundriss der Chirurgie* (1880–82).

Hermann Maas (1842–86) graduated at Breslau in 1865, and became assistant to Middeldorpf, and privatdocent, and in 1877 professor of surgery at Freiberg. His chief work was his *Kriegschirurgische Beiträge aus dem Jahre 1866* (published in 1870).

Heinrich Wilh. Franz Leisrink (1845–85) studied in Göttingen and Kiel, graduating in 1868, and settled in Hamburg, where he became distinguished as a surgeon and contributed some valuable papers to periodicals. His most important work was *Die moderne Radikal-Operation der Unterleibsbrüche, eine statistische Arbeit* (1885).

Paul Fried. Immanuel Vogt (1849–85) studied at Greifswald, graduating in 1865, and in 1882 succeeded Hueter as professor of surgery. His principal works were—*Die chirurgischen Krankheiten der oberen Extremitäten* (1881) and *Mittheilungen aus der Chirurgischen Klinik in Greifswald* (1884).

Richard von Volkmann (1830–89), son of Alfred Wilhelm Volkmann, professor of anatomy and physiology in the University of Halle, was educated at Halle, Giessen, and Berlin, and obtained his medical degree in 1854. He was an assistant in the surgical clinic of Professor Blasius, in 1857 became privatdocent, and in 1867 professor of surgery at Halle. With Langenbeck and Simon he founded the German Surgical Association, and in 1874 said before this society: "There is no such thing as luck in surgery: for every case of pyæmia, erysipelas, and necrosis after amputation the surgeon who treats it must be held responsible." His contributions to surgery and to surgical literature were numerous and important, and he was the first German carefully to study Lister's methods and to urge their adoption upon German surgeons. Volkmann was a poet as well as a surgeon, but issued his poems under another name, and few persons know that Richard Leander, the German poet, is the same person as Richard Volkmann, the famous surgeon of Halle.

Theodor Billroth (1829–94), a native of Bergen on the island of Rügen, studied at Greifswald, Göttingen, and Berlin, graduating at the latter university in 1852. He became assistant to von Langenbeck, privatdocent in 1856, professor of clinical surgery at Zurich in 1860, and professor of surgery in the University of Vienna in 1867, succeeding Franz Schuh. During the last twenty-five years he has been one of the most celebrated surgeons in the world as an investigator in surgical pathology, a bold and successful operator, a voluminous writer, and a clinical teacher. He first excised the larynx for cancer in 1873, first successfully excised a large portion of the stomach in 1881, and gave a strong impetus to the progress of operative surgery of the intestinal tract. His lectures on surgical pathology and therapeutics have passed through many editions and translations; his reports on clinical surgery were translated into English in 1881, and the total number of his published books and papers was about one hundred and forty.

The history of surgery in Denmark is merely the old story of the barbers and barber surgeons until near the end of the eighteenth century. The University of Copenhagen was founded in 1479, and possessed a nominal medical faculty consisting of two or three physicians who read the works of Galen and Avicenna. In 1559 some attempt was made to introduce anatomical studies, and the young physicians had to travel in foreign countries before completing their studies and obtaining their degree. In 1577, Frederick II. issued statutes for the Collegium Chirurgicum of Copenhagen, in which it was ordered, seeing that from ancient time there had been only six barbers in the city—*i. e.* barber surgeons—that the term of apprenticeship should be three years, and then the apprentice was to travel in foreign countries for four consecutive years. Travelling lithotomists had to obtain the approval of the corporation before they were allowed to operate. Controversies between the physicians and the barbers occurred as a matter of course. In 1736, Simon Krueger (1687–1760), a barber surgeon, with others, founded the "Theatrum Anatomico-chirurgicum," a school for teaching anatomy and surgery, which prospered for the next twenty-four years, but was suppressed in 1772. In 1783 the Academia Chirurgica was created. Krueger was an excellent teacher, but wrote very little.

Heinrich von Moinichen, a surgeon of Copenhagen, published in 1665 his *Observationes Medico-chirurgicæ*, of which there were three later editions.

Georg Heuermann (1722–68), professor of medicine in the University of Copenhagen, published in 1754–57 his *Abhandlung der vornehmsten chirurgischen Operationen am menschlichen Körper*, a well-arranged and illustrated work.

Alexander K. Koelpin (1731–1801) graduated in 1763, after which he studied under Hunter in London and Le Cat in Rouen, and returned to Copenhagen and became chief surgeon of the Friedrichs Hospital in 1766. In 1785 he became professor of the newly-organized surgical academy.

Henry Callisen (1740–1824), a native of Holstein and a pupil of Simon Krueger, passed his preliminary examination in 1767, after which he studied at Paris and under William Hunter in London. Returning to Copenhagen, he became chief surgeon of marines, and took his degree as doctor in 1772, and in 1773 succeeded Burger as professor of surgery. His *Institutiones chirurgicæ hodiernæ* (1777) and his *Systema chirurgiæ hodiernæ, etc.* (1778) passed through several editions and translations, and were popular text-books until the beginning of the nineteenth century.

Adolf Carl Peter Callisen (1787–1866), a nephew of Henry Callisen, graduated at Kiel in 1809, and became a professor in the Surgical Academy in Copenhagen in 1817. In 1842 he was professor of surgery in the university. His best-known work is his *Medicinisches Schriftsteller-Lexicon der jetzt lebenden Aerzte, etc.* (in 33 vols. 8vo, 1830–45).

The first distinguished surgeon in Sweden was Olaf Acrel (1717–1806), who was chief surgeon of the Seraphim Hospital in Stockholm after its foundation in 1752. He became professor of surgery in 1755, and his teachings had great influence in the development of surgery in Sweden. His principal work is *Kirurgiska Handelser* (Stockholm, 1759), which was translated into Dutch in 1771, and into German in 1772 and 1777.

Peter af Bjerkin (1755–1818), a pupil of John Hunter and a surgeon in the Finnish army, became chief surgeon of Stockholm in 1809. He was the greatest Swedish surgeon in the early part of this century, but wrote nothing of importance.

The first professor of surgery and obstetrics at the University of Christiania was Magnus Andreas Thulstrup (1769–1844), a native of Copenhagen, who entered the Norwegian military medical service, became surgeon-general, and in 1814 professor. He wrote very little.

Jacob Christian Johan Henrik Gundelach Moeller (1797–1845), a native of Jutland, studied in Copenhagen, and in 1842 became professor of surgery, and was a distinguished clinical teacher.

Joh. August Liborius (1802–1870), a surgeon of Gothenburg, was well known in his day as a skilled practitioner, and wrote on the starched bandage, on hemorrhoids, and on herniotomy.

The leading surgeon of Sweden in recent years was Carl Gustav Santesson (1819–86), a native of Gothenburg, who graduated at Upsala in 1846, and became professor of surgery in the Stockholm school in 1849, retiring in 1885. He contributed a number of papers to the journals, and published *Om höftleden och ledbrosken uti anatomiskt pathologiskt och chirurgiskt hänseende, etc.* (Stockholm, 1849). He was a skilled surgeon, a great teacher, and an accomplished gentleman.

There is little to be said of the history of surgery in Russia prior to the middle of the nineteenth century. The priests were the physicians for the great mass of the people, but a few medical men were brought from other countries during the sixteenth, seventeenth, and eighteenth centuries for the service of the court. Among these was Bidloo, who induced Peter I. to found a medico-chirurgical college and hospital in the early part of the eighteenth century. In 1768, Simon Zybelin was professor of anatomy and surgery in the University of Moscow, and in 1812, Andreas Sydoratzky (1788–1815) was a teacher of surgery in the same university, but no record of their work is accessible.

Leo Nagumowitsch (1792–1815), an army surgeon, published, in Russian, in 1832, a handbook on the treatment of gunshot wounds, and Joseph Czekierski (1777–1826), a surgeon of Warsaw and professor of surgery in the medical faculty created in 1809, published a manual of surgery (4 vols., 1817–18).

Elias Bujalski (1789–1864), anatomist in the Military Medico-chirurgical School at St. Petersburg, published his *Tabulae anatomico-chirurgicae* in 1828 and again in 1852.

Christian Salomon, professor of surgery at St. Petersburg, published his handbook of operative surgery in Russian, in two volumes, in 1840.

The first distinguished Russian surgeon was Nikolaus Iwanowitsch Pirogoff (1810–81), who studied at Moscow and Dorpat and obtained his degree in 1832, after which he studied in Berlin and Göttingen for two years. On his return he gave lectures on surgery at Dorpat, being the first Russian professor there. After five years in Dorpat, in 1840, he was appointed professor of surgery in the Medico-chirurgical Academy of St. Petersburg. His attempts to improve the sanitary condition of the military hospital connected with the academy created much ill-feeling, and for a time he was considered and treated as insane. During the Crimean War he was active at Sevastopol, and incurred ill-will by his denunciation of the abuses connected with the Russian military administration during the siege, the result of which was that he was compelled to resign his professorship in the academy at St. Petersburg. His contributions to surgery were numerous in relation to gunshot

wounds, amputations, and the surgery of bones, and his name is connected with a method of osteoplastic amputation through the foot devised by him in 1854. The list of his publications is a long one, the most important being his *Recherches pratiques et physiologiques sur l'éthérisation* (1847); *Rapport médical d'un voyage au Caucase, contenant la statistique comparative des amputations, etc.* (1849); *Anatome topographica sectionibus per corpus humanum congelatum, etc.* (fol., 1852–59); *Chirurgische Anatomie der Arterien-staemme und Fascien* (1861); and *Grundzüge der allgemeinen Kriegschirurgie* (1864).

Little is known of the Russian surgeons who wrote only in Russian, for very few of their works have been considered worth translating.

Ivan Rklizky (1805–61), professor of clinical surgery at St. Petersburg, in 1847 published a treatise on operative surgery in Russian, of which there were two later editions.

Peter Dubovizki (1815–67), professor of surgery at Kasan, in 1837 published a treatise on hemorrhage, and one on lithotripsy in 1838.

Sablozky-Desjatovski (1816–82), professor of surgery at the Medical Academy of St. Petersburg in 1842, wrote on hernia, diseases of the testicle, and venereal diseases.

Polycarp Girsztowt (1827–77) studied in St. Petersburg, was an army surgeon in the Crimea in 1853–56, and became professor of surgery in Warsaw in 1860. He contributed to periodical literature, but wrote no special work of any importance.

Hippolyt Korzeniowski (1827–79) studied at St. Petersburg, became professor of surgery in Warsaw in 1868, and professor of surgery in St. Petersburg in 1871.

Karl Daniel von Haartman (1792–1877) was professor of surgery and obstetrics in the University of Helsingfors from its foundation in 1833. He published *Casus chirurgici* in 1815.

One of the most distinguished and best known of modern Russian surgeons was Julius Szymanowsky (1829–68), a native of Riga, who studied at Dorpat, graduating in 1856. In 1858 he went to Helsingfors as assistant professor of surgery, and in 1861 accepted a call to Kiew, where he acquired a great reputation. He was a skilful operator and an excellent teacher. His principal publications are *Der Gypsverband mit besonderer Berücksichtigung der Militärchirurgie* (1857) and a treatise on operative surgery in Russian (1864–65), of which the first part was translated into German and published in 1872.

Carl Reyher (1846–90), a native of Riga, studied at Dorpat, graduating in 1871, became an assistant of von Bergmann, and privatdocent, entered the Russian army medical service, and became a distinguished surgeon and teacher in St. Petersburg. His principal publications relate to antiseptic methods, diseases of the joints, laryngotomy, and gunshot wounds.

Upon the establishment of the Spanish rule in Mexico the medical system of Spain was established with it, including the barbers and the barber surgeons. The first provision for the examination of physicians and surgeons appears to have been made in 1646, being a board composed of three persons, two of whom were physicians connected with the university. From this date to 1700 it is reported that forty-seven physicians, one surgeon, three apothecaries, and eighteen barbers were

examined and authorized to practise. Evidently the barbers had the greater part of the surgical practice. In 1742 it was ordered that no surgeon should undertake to practise medicine nor to give purgatives or emetics or diaphoretics or other drugs, and that no apothecary should put up prescriptions of a surgeon for such drugs. In short, it is the old story of an attempt by the physicians to suppress the surgeons. In 1719 it was ordered that in the examination of the surgeons no one should be approved who had not seen some practice in hospitals, and in 1720 all the practitioners of medicine, surgery, anatomy, and algebra were notified of the necessity of passing this examination. (By "algebra" here is meant "bone-setting.") (See "Historia de la Medicina de 1646–1700," by Dr. Reyes, *Gaceta Médica de Mexico*, 1865–66.)

For a long time after the first settlements on the Atlantic coast of North America very few educated physicians were among the immigrants. The clergy included many men of learning, talents, and piety, and some distinguished lawyers accepted offices in the new colonies, but there was little attraction for skilled physicians. Some of the so-called "ship surgeons" remained, having commenced by practising on shore while their vessels were in port. The following extract from the Dutch records, dated February 2, 1652, contains a notice of these barber surgeons:

"On the petition of the Chirurgeons of New Amsterdam, that none but they alone be allowed to shave; the Director and Council understand that shaving doth not appertain exclusively to chirurgery, but is an appendix thereunto; that no man can be prevented operating on himself, nor to do another this friendly act, provided it be through courtesy and not for gain, which is hereby forbidden." It was then further *Ordered*, that ship-barbers shall not be allowed to dress any wounds, nor administer any potions on shore, without the previous knowledge and special consent of the petitioners, or at least of Doctor La Montague.

In 1662 an act regulating chirurgeons' accounts was passed in Virginia (*Hen. Stat. Va.*, vol. ii. p. 109).

At a somewhat later period in Connecticut the popular feeling seems to have been rather in favor of ignorance in a medical man, if we may judge from the fact that in 1766 the physicians of Litchfield county, having endeavored to form a medical association and having applied for a charter for that purpose, were refused by the General Assembly on the ground that it would form a monopoly, and that as to quacks and ignorant men it was shown that they never administered any physic without the prayers of the minister (which cannot be said of the educated physicians), and that no medicine can be serviceable without the blessing of God. (See Peters' *General History of Connecticut.*)

In the early days of New England medicine was in its primitive stage, being in the hands of the clergy. The earliest practitioners or writers on medical subjects were clergymen, many of whom had regularly studied medicine in order to fit themselves for the duties of their new field, just as some of those intending to be missionaries do at the present day. For example, Charles Chauncy, the second president of Harvard College, graduated in both divinity and medicine at Cambridge, and is said to have been of the opinion that there ought to be no distinction between them, educating his six sons in both professions.

The first printed document relating to medicine issued in New England is by a clergyman, Thomas Thatcher, who came to this country in 1685. It is a broadside sheet or poster headed "Brief Rule to Guide the Common People of New England How to Order Themselves and Theirs in the Small Pocks or Measels." This is usually said to be the first medical work published in America, but several were printed in Mexico during the sixteenth century, as, for example, *Alphonso Lopez de Hinojoso summa y recopilacion de cirugia con un arte para sangrar y examen de Barberos: Va añadido en esta secunda editione, el origin y nacimiento de las reumas* [etc.]. (Mexici, 1595, 4to.)

The first methodical attempt at the regulation of practice appears to have been made by Virginia in 1736 in an act regulating fees and the accounts for the practice of physic. This fixed the fee for the ordinary surgeons or apothecaries at five shillings a visit within five miles, and ten shillings within ten miles, but those persons who have studied physic in any university and taken a degree therein are allowed double these rates.

In 1760 an act was passed by the city of New York forbidding any one to practise as a physician or surgeon in said city until he should have been examined and approved by a board composed of "one of his Majesty's council, a judge of the supreme court, the attorney-general, and the mayor," who may call in to their assistance such person or persons as they think fit. A similar law was passed in New Jersey in 1772, the examiners being any two of the judges of the supreme court. In Maryland, the District of Columbia, and South Carolina the business of examination and licensing was placed in the hands of the medical societies. The distinction between physician and surgeon soon disappeared, and there is no trace of separate organizations for these two classes of practitioners.

The majority of the regularly educated physicians in this country in 1776 were graduates of the University of Edinburgh, the first American-born graduate of that school having been John Moultrie of South Carolina, who obtained his degree in 1749. The first dissection of the human body in this country was made in New York by Drs. Bard and Middleton in 1750. In 1756 a course of lectures on anatomy and surgery, with demonstrations on the dead body, was given at Newport, Rhode Island, by Dr. William Hunter, a cousin of John Hunter and an Edinburgh graduate. The first regularly organized medical school was established in Philadelphia by Drs. William Shippen and John Morgan, both natives of Philadelphia and graduates of Edinburgh; Dr. Shippen lectured on anatomy and surgery.

The only surgical work by an American author printed in the United States prior to 1800 was the *Plain, Concise Practical Remarks on the Treatment of Wounds and Fractures*, by Dr. John Jones (New York, 1775), reprinted at Philadelphia in the following year with Van Swieten on *The Diseases Incident to Armies and Gunshot Wounds*, the whole forming a small volume which was the manual of the American army surgeons during the Revolutionary War.

Dr. John Jones (1729–91), a native of New York, studied in London under Pott, in Paris under Petit and Le Dran, and in Edinburgh under Monro, was surgeon with troops in the French Colonial War of 1758,

and professor of surgery in King's (now Columbia) College from its commencement in 1767. He is said to have performed the first operation of lithotomy in this country. His book, above referred to, is, in the main, a compend of the teachings of Pott and Le Dran, but contains a few original observations, the most remarkable of which is a case of trephining in delirium occurring eighty days after an apparently slight injury of the head. There was no fracture. After perforating the bone he opened the dura mater, but found nothing, and the result was prompt recovery. At the beginning of the nineteenth century the leading surgeons in the United States were the two Warrens in Boston, Physick in Philadelphia, and Wright Post in New York.

John Warren (1753–1815) was the first professor of anatomy and surgery in the Medical School of Harvard University, which opened in 1783, being the first medical school in New England. He amputated at the shoulder-joint in 1781, extirpated the parotid gland in 1804, and had a great reputation as an operator and teacher, but wrote only a few addresses and journal articles.

His son, Dr. John Collins Warren (1778–1856), studied in London, Edinburgh, and Paris, and returned and joined his father in practice in 1802, becoming adjunct professor in anatomy and surgery in 1806, and professor in 1815. He was a skilful operator, and introduced several new operations, such as excision of the hyoid bone in 1804 and excision of the elbow in 1834. In 1837 he published his *Surgical observations on tumors*, chiefly a collection of cases observed and treated by him—an important work for reference. He was practically the introducer of anæsthesia in surgical operations.

Philip Syng Physick (1768–1837), called by some the "Father of American Surgery," a native of Philadelphia, a pupil and personal friend of John Hunter, who refers to him in his treatise on the blood as having performed many of the experiments referred to, took his medical degree at Edinburgh in 1792, became surgeon of the Pennsylvania Hospital in 1794, and was appointed in 1805 to the chair of surgery established in the University of Pennsylvania in that year. His contributions to practical surgery were numerous, but he wrote nothing, and his views are, for the most part, known through the treatise of his nephew, Dr. Dorsey. Among these contributions may be mentioned the lengthening of Desault's splint for fracture of the femur, which reached only to the crest of the ilium, making it extend from the axilla to below the foot; the internal division of stricture of the urethra; the use of the seton in ununited fracture; his operation for the cure of preternatural anus; and the washing out of the stomach by means of a gum-elastic catheter and a syringe in a case of poisoning.

The first lectures on surgery in Philadelphia were given by Dr. William Shippen (1733–1808), a native of Philadelphia, who studied in Leyden, Edinburgh, and London, and was a special pupil of William Hunter. In 1762 he gave a course of private lectures on anatomy and surgery in Philadelphia, and in 1765 became professor of anatomy and surgery in the Medical Department of the University of Pennsylvania, just established.

Wright Post (1766–1822), a native of New York, studied in London in 1784–86 under Mr. Sheldon, and was appointed professor of surgery

in Columbia College in 1792. He, first in this country, performed the Hunterian operation for aneurism of the femoral in 1796, ligated the subclavian on the outer side of the scaleni in 1817, and in 1813 successfully ligated the external iliac, this being the second operation of this kind. He was a skilled anatomist and a good teacher, but he wrote nothing beyond a few accounts of cases.

The first systematic treatise on surgery published by an American author was the *Elements of surgery* of Dr. Dorsey (Philadelphia, 2 vols. 8vo, 1813), of which a second edition appeared in 1818, and a third in 1823.

John Syng Dorsey (1783–1818), a native of Philadelphia, studied under his uncle, Dr. Physick, and afterward in London and Paris, and in 1807 became adjunct professor of surgery in the University of Pennsylvania. His book was a popular text-book; its chief value is due to the fact that it contains so much of the experience of Dr. Physick. In 1811 Dorsey successfully ligated the external iliac for inguinal aneurism, this being the first case of that operation in the United States.

In 1819, Dr. Physick resigned as professor of surgery to become professor of anatomy, the chair of surgery being filled by Dr. Gibson. Dr. William Gibson (1788–1868) was born in Baltimore, Md. He studied in Edinburgh, where he graduated in 1809, was a pupil of John Bell, and, after his graduation, of Sir Charles Bell in London; professor of surgery in the University of Maryland in 1812, and professor of surgery in the University of Pennsylvania from 1819 to 1855, when he resigned. In 1824 he published his *Institutes and practice of surgery*, which became a popular text-book, the eighth edition having appeared in 1850. He was the first to perform the operation of ligation of the common iliac, which he did in 1812, and successfully to repeat the Cæsarean section on the same patient, which he did in 1837. His reports on rupture of the axillary artery in attempts to reduce old dislocations of the head of the humerus contributed greatly to his reputation. He formed a large and valuable collection of pathological specimens, colored drawings of tumors, etc., some of which are now in the Army Medical Museum at Washington.

The surgeon of the first part of this century whose name is now best known to fame was Dr. Ephraim McDowell (1771–1830), a native of Virginia, who studied in Edinburgh in 1793 under John Bell, who was then giving special attention to diseases of the ovaries. In 1795 he commenced practice at Danville, Kentucky, and soon became the leading physician of the West. In 1809 he performed the first methodical excision of the ovary for the cure of tumor of that organ, and published an account of it, and of two other similar cases, in the *Eclectic Repertory* of Philadelphia in 1817. His reports of the operation attracted little attention at the time, and the few published comments on them were mostly expressions of doubt as to the accuracy of his statements; but the paper of Mr. Lizars, "Observations on the extirpation of the ovaria," in the *Edinburgh Medical and Surgical Journal* in 1824, made them generally known, and although it was long after that date before ovariotomy became recognized as a proper surgical operation, yet the credit due to McDowell for originating it has never since been seriously disputed. He wrote very little and very reluctantly, and was not a teacher

in any school, but his name stands high in the list of the great surgeons of America.

Another distinguished surgeon of this period was Dr. Nathan Smith (1762–1829), a native of Massachusetts, who studied in the Harvard Medical School, in Edinburgh, and in London, and in 1797 founded a medical school in connection with Dartmouth College. In 1813 he became professor of medicine and surgery in Yale College. He was the second person to perform ovariotomy in this country, which he did in July, 1821, without any knowledge of the work of McDowell. He performed the first amputation at the knee-joint in the United States in 1824, first used the trephine in localized inflammation and abscess of the shafts of the long bones, and introduced the manipulation method in the treatment of dislocations of the hip-joint. He wrote little, but an account of his methods and practice is given in a little book entitled *Medical and surgical memoirs*, edited by his son, Nathan R. Smith (published at Baltimore in 1831). It contains an excellent paper on necrosis, a description of an improved apparatus for the treatment of fractures of the femur, remarks on dislocations of the hip, etc.

Some bold operations were performed in these early days by men who wrote nothing and of whom little is known; for example, abdominal section for extra-uterine pregnancy in 1759 by John Bard of New York, and in 1791 by William Baynham; the ligation of the common carotid in 1803 by Mason Fitch Cogswell, and in 1807 by Dr. Amos Twitchell of New Hampshire; the complete excision of the clavicle in 1811 by Dr. Charles McCreary of Kentucky; and the excision of a part of the lower jaw by Dr. Wm. H. Deadrick of Tennessee in 1810. In 1819, Dr. Wm. C. Daniel of Savannah first employed extension by means of a weight in the treatment of fracture of the femur, but did not publish the method until 1829 (*Am. J. Med. Sc.*, 1829, iv. 330). In 1823, McGill of Maryland successfully ligated both carotids; in 1824, Dr. D. L. Rodgers removed nearly the whole of both upper jaws.

Between 1820 and 1850 the prominent surgeons in the large cities were John C. Warren and George Hayward in Boston; Valentine Mott, J. Kearny Rodgers, Willard Parker, Alfred C. Post, and John Watson in New York; W. Gibson (above referred to), J. R. Barton, George McClellan, George W. Norris, and Thomas D. Mütter in Philadelphia; Nathan R. Smith in Baltimore; R. D. Mussey in Cincinnati; and Daniel Brainard in Chicago.

Valentine Mott (1785–1865), a native of Long Island, the son of a physician, studied medicine at Columbia College, obtaining his degree in 1806. He then went to London, became a pupil of Astley Cooper, returned in 1810, and was appointed professor of surgery in Columbia College, and in 1813, when this school was merged in the faculty of the College of Physicians and Surgeons, he retained the chair of surgery. In 1826, with the other professors of the College of Physicians and Surgeons, he resigned his chair, and then with several of his associates founded the Rutgers Medical College; he took the chair of operative surgery in the College of Physicians and Surgeons, which he resigned in 1834 on account of his health. In 1840 he was appointed to the professorship of surgery in the Medical Department of the University of New York. For the next ten years his reputation drew crowds of students from all

parts of the United States. In 1850 he resigned the chair, making another visit to Europe. In the spring of 1852 he was appointed emeritus professor of surgery in the Medical Department of the University of the City of New York, and from that time until his death he delivered an annual course of lectures.

Mott's first contribution to operative surgery was the ligature of the innominate artery in 1818, the patient surviving for a long time, but finally dying of secondary hemorrhage. The case established the practicability, and the propriety in certain cases, of the operation. It was finally successfully performed by Dr. A. W. Smythe of New Orleans in 1864, in which case repeated hemorrhages also occurred, and the vertebral artery was ligated fifty-four days after the first operation. Mott first applied a ligature to the primitive iliac in 1827; in 1828 he entirely removed the clavicle for osteosarcoma; in 1812 he made an original operation for the relief of ankylosis of the lower jaw. At the time when, in 1821, he excised the right half of the lower jaw in a case of tumor he was not aware that a similar operation had been performed in 1810 by Dr. W. H. Deadrick of Tennessee, since no history of the operation was published until 1828. Dupuytren in 1812 had removed a large part of the lower jaw for cancer. Amputation of the hip-joint was performed by Dr. Mott in 1824, and it was for some time supposed that it was the first operation of the kind in America, but it is now known that it was performed by Dr. Walter Brashear of Kentucky in 1806, but no account of his case had ever been published. Speaking of his excision of the clavicle, Dr. Mott called it his "Waterloo operation," since it was performed on the 17th of June, the day before the anniversary of that battle. In 1813, Dr. Charles McCreary had removed the right clavicle for disease of the bone, but it was little enlarged, comparatively isolated, and the operation was a very simple one, being entirely different from the extremely difficult operation performed by Dr. Mott. The patient rapidly recovered. Besides the innominate artery, he tied the subclavian eight times, the primitive carotid fifty-one times, the carotid twice, the common iliac once, the external iliac six times, the internal iliac twice, the femoral fifty-seven times, and the popliteal ten times. His writings consist mainly of reports of cases and operations for periodicals.

J. Kearny Rodgers (1793–1851), a native of New York, was a pupil of Dr. Wright Post and graduated at the College of Physicians and Surgeons in 1816. He studied in London under Astley Cooper, became surgeon of the New York Hospital in 1822, and tied the left subclavian artery within the scaleni for aneurism in 1845, the first time this operation had been performed: it was unsuccessful. The first successful operation of this kind was by Dr. Halsted of Baltimore in 1892. Dr. Rodgers successfully wired an ununited fracture of the humerus in 1827 after excision had been unsuccessfully performed, perhaps the first operation of this kind, and made a cuneiform osteotomy in ankylosis of the hip in 1840. He wrote only a few papers for periodicals.

Willard Parker (1800–84), a native of New Hampshire, studied under John C. Warren, and graduated at Harvard in 1830. He was for a short time professor of surgery in Berkshire Medical College, and was a colleague of Gross in Cincinnati. In 1839 he became professor

of surgery in the College of Physicians and Surgeons, surgeon of Bellevue Hospital in 1845, and surgeon of the New York Hospital in 1856. He was an excellent teacher and operator and greatly beloved by his pupils, who constituted his best contributions to surgery. He was the first operator for strabismus in this country.

Alfred C. Post (1805–85), a native of New York and a nephew of Dr. Wright Post, graduated in medicine at the College of Physicians and Surgeons in New York in 1827, and continued his studies in Paris, Berlin, and Edinburgh. He was one of the founders of the Medical Department of the University of the City of New York in 1851, in which he was professor of surgery and pathological anatomy. He wrote no systematic treatise, but contributed numerous cases to the journals, and was specially skilled in plastic surgery.

John Watson (1807–63), a native of Ireland, came with his parents to America in 1810, and graduated in 1832. He became surgeon of the New York Hospital in 1838, where he first introduced regular clinical instruction in surgery, though Dr. Alexander H. Stevens had previously delivered occasional clinical lectures. He contributed many cases to journals, but wrote no systematic treatises. He collected what was at that time the most valuable private medical library in this country, the greater part of which, after his death, was left to the New York Hospital Library.

John Rhea Barton (1794–1871), a native of Lancaster, Pa., graduated at the University of Pennsylvania in 1818, and became surgeon of the Pennsylvania Hospital. His name is associated with a form of fracture of the lower end of the radius, with a special form of bandage for fracture of the jaw, and with osteotomy for ankylosis, which he first performed in 1826. In 1834 he wired a fractured patella.

George McClellan (1796–1847) was a native of Connecticut and a pupil of Dr. Dorsey, graduating at the University of Pennsylvania in 1819. He founded the Jefferson Medical College in 1824, in which he was professor of surgery until 1838. He excised the body of the lower jaw in 1823, excised the parotid gland for tumors, and was a bold and showy operator. After his death his book on *Principles and practice of surgery* was published in 1848: it is noteworthy only for the very excellent description of shock which it contains.

George Washington Norris (1808–75) was a native of Philadelphia, and graduated at the University of Pennsylvania in 1830. After two years' service in the Pennsylvania Hospital he went to Paris, and studied under Dupuytren, Velpeau, and Roux. He became surgeon to the Pennsylvania Hospital and professor of clinical surgery in the University of Pennsylvania. His name is well known in medical literature from the extremely valuable statistical contributions to practical surgery which he published in the *American Journal of the Medical Sciences* between 1828 and 1854. They rank among the best work of this kind which has ever been done in any country, and his results are quoted in all subsequent treatises upon the subjects upon which he wrote.

Thomas Dent Mütter (1811–59), a native of Virginia, graduated at the University of Pennsylvania, after which he studied medicine in Paris. He became professor of medicine in the Jefferson Medical College in 1841, and is celebrated for his plastic operations for the cure of

deformities resulting from burns. He gave his museum to the College of Physicians of Philadelphia, with thirty thousand dollars for its maintenance and the endowment of a lectureship. In this connection may be mentioned:

William E. Horner (1793–1853), a native of Virginia, who became a surgeon in the hospital department of the army in 1813, when he was twenty years old and before he had graduated. He became professor of anatomy in the University of Pennsylvania in 1831, succeeding Dr. Dorsey. His name is connected with the Wistar and Horner Museum, which he bequeathed to the university, and also with the muscle which he named the "tensor tarsi." His contributions to surgery are to be found in papers in the *American Journal of the Medical Sciences.*

R. D. Mussey (1780–1866), a native of New Hampshire, studied medicine under Dr. Nathan Smith, and graduated at the University of Pennsylvania in 1809. He was professor of the theory and practice of medicine at Dartmouth, 1814; professor of anatomy and surgery in the same school, 1819; professor of surgery in the Medical College of Ohio at Cincinnati in 1838; and professor of surgery in the Miami Medical College in Cincinnati in 1852. He was a bold operator, and first tied both carotid arteries in 1827 for a large bleeding tumor of the head, and removed the scapula and clavicle for tumor following amputation at the shoulder-joint. His only contributions to surgical literature were in the shape of reports of cases in the journals.

Daniel Brainard (1812–66), a native of Western New York, graduated at the Jefferson Medical College, Philadelphia, in 1834. He successfully amputated at the hip-joint in Chicago in 1838, which established his reputation, and in 1854 published an excellent essay on the treatment of ununited fractures. He was the founder of Rush Medical College.

One of the most celebrated surgeons of the West of this period was Benjamin W. Dudley (1785–1870), a native of Virginia, who graduated at the University of Pennsylvania in 1806, after which he studied in Paris and London, returning to Lexington in 1814, and became professor of anatomy and surgery in the Medical Department of the Transylvania University in 1817. His reputation rested mainly upon his operations for lithotomy, which he performed two hundred and twenty-five times with almost unparalleled success. He wrote nothing except a few short essays, the first of which, *Observations on injuries of the head* [including cases of trephining for epilepsy], was published in the first number of the *Transylvania Journal of Medicine* in 1828, and is a very important paper in the history of this operation.

We now come to an epoch in the history of surgery. On November 3, 1846, Dr. Henry J. Bigelow read before the American Academy of Arts and Sciences an abstract of a paper which was published in full in the *Boston Medical and Surgical Journal* of November 18, 1846, under the title "Insensibility during surgical operations produced by inhalation," which was the first definite account of the method of production of satisfactory anæsthesia in surgical operations. Writers of the thirteenth and fourteenth centuries had described the inhalation of narcotic vapors from certain plants for this purpose. Sir Humphry Davy had suggested in 1800 that "nitrous oxide may probably be used with advantage in surgical operations." Mr. Hickman, a London surgeon,

had written in 1828 a letter to King Charles X. (which letter was laid before the Academy of Medicine of Paris), in which he said that he had discovered the means of performing the most troublesome operations without pain by producing insensibility by the introduction of certain gases into the lungs (*Archiv. gén. de méd.*, 1st ser. xviii. p. 453). Dr. Crawford W. Long of Athens, Ga., had produced anæsthesia by ether in 1842 for the operation of removing small tumors, but had not published the results, when Dr. Warren allowed a dentist, Dr. Morton, to give ether to produce insensibility while he performed a small operation in the Massachusetts General Hospital.

It is to Warren, Hayward, and Bigelow that the surgical world is indebted mainly for a sufficient, general, and safe method of anæsthesia. Morton wanted to patent his method, which was not a thoroughly safe one until modified by Bigelow, and little credit is due to him or to Wells or Jackson for the part which they then played in the business. The statements of Dr. Bigelow were readily accepted by surgeons, and early in 1847 anæsthesia was in general use throughout the civilized world.

Nothing like it had been known before, and there has been little improvement in it since, for chloroform, though more convenient for use, is decidedly more dangerous than ether in many cases. Most of the great operations had been devised and performed by a few skilled operators before the introduction of anæsthesia, but the performance was not in the deliberate, careful manner which is now well recognized as characterizing the best surgery, especially in these days of asepsis and antisepsis. The influence of anæsthesia upon surgical diagnosis has been almost as great as upon methods of operation, for with its aid it is possible to explore the interior of the body in ways that would be impossible without it. With its aid the recent graduate undertakes operations which he would not dream of trying without it: it has done away with the need for some of the most special qualifications which formerly were thought to be, if not indispensable, at least of great importance to the operator.

Henry Jacob Bigelow (1816–90), a native of Boston, took his medical degree in 1841, after which he spent three years in Europe, most of the time in Paris. In 1845 he was appointed instructor of surgery at the Tremont Street Medical School. In 1846 he was made surgeon to the Massachusetts General Hospital, and in 1849 was appointed professor of surgery in the Harvard Medical School, the two chairs of surgery and clinical surgery, previously held by Dr. J. C. Warren and Dr. George Hayward, being united. He performed the first excision of the hip-joint in this country in 1852, and first explained the mechanism of the ileo-femoral ligament and its importance in reducing dislocations of the hip-joint. His chief contribution to surgery was his operation of litholapaxy, which has effected a great change in the treatment of vesical calculus. He was a graceful and dexterous operator, a clear and epigrammatic teacher, and the leading surgeon in New England until he retired in 1882.

The number of American surgeons who have become known as inventors, teachers, or writers since 1850 is very large, and only a brief notice can be given of the most prominent. In New York we have had William H. Van Buren (1819–83), who studied in Paris, was an assistant surgeon in the army for four years, in 1845 joined Mott in

clinical teaching, became professor of anatomy in 1852, and professor of surgery in the Bellevue Medical College in 1868. His *Contributions to practical surgery* appeared in 1865, and his work on *Diseases of the genito-urinary system* in 1874.

Gurdon Buck (1807–77), surgeon of the New York Hospital in 1837, and of St. Luke's in 1858, made valuable contributions to surgery in the method of treating fractures of the thigh by weight and pulley, in the plastic surgery of the face, and in the treatment of ankylosis of the knee.

James R. Wood (1816–82), the first to introduce clinical teaching in Bellevue Hospital, and one of the founders of Bellevue Medical College, was a bold operator and a very popular teacher. He removed the entire lower jaw in a case of phosphorus-necrosis, leaving the periosteum from which a new jaw was formed; excised Meckel's ganglion with the superior maxillary branch of the fifth pair; and was one of the first in America to perform excision of the shoulder- and elbow-joints.

Frank H. Hamilton (1813–66), a native of Vermont, graduated in Philadelphia in 1833; became professor of surgery in Buffalo in 1844, and in the Bellevue Medical College in New York in 1862. He published his *Practical treatise on fractures and dislocations* (Philadelphia, 1860) and his *Practical treatise on military surgery* (1861; 2d ed. 1865).

Alden March (1795–1869) settled in Albany in 1820 after graduating at Brown University, Rhode Island, and commenced lecturing on anatomy in 1821, being the first lecturer in that city. He was professor of surgery in the Albany Medical College in 1838, and gave one of the first surgical clinics in this country. He made valuable investigations in hip-joint disease, and performed a large number of surgical operations, including sixty-five amputations through the thigh and eleven excisions of the lower jaw.

Henry Berton Sands (1830–88) graduated from the College of Physicians and Surgeons in New York in 1854; studied in Paris; and on his return became professor of anatomy, and then of surgery. He was surgeon to the Bellevue and New York Hospitals and to the Roosevelt Hospital, and in the latter part of his life was the leading surgeon in New York City. He was the first to operate in peritonitis due to perforation of the appendix.

Here also may be mentioned J. Marion Sims (1813–83), a native of South Carolina, who commenced practice in Montgomery, Alabama, and there devised his mode of operating for vesico-vaginal fistula; he came to New York in 1853, and became the founder of modern gynæcology.

The Philadelphia surgeons of this period who have finished their work are Gross (father and son), Agnew, Pancoast, and Smith.

Samuel D. Gross (1805–84), a native of Pennsylvania and a graduate of the Jefferson Medical College in 1828, after filling various chairs in Western schools and in New York accepted the chair of surgery in the Jefferson Medical School in 1865, from which he retired in 1882. He was a man of strong personality and great influence, an incessant worker, a voluminous writer, an excellent teacher, and one of the most distinguished surgeons of his time. He wrote the first systematic treatise on pathological anatomy by an American author, made original experiments on wounds of the intestines, published

valuable monographs on diseases of the bladder (1851; 2d ed. 1855), on foreign bodies in the air-passages (1854), and a system of surgery in two large volumes (1859; 6th ed. 1882), which is an important book of reference.

His son, Samuel W. Gross (1837–89), graduated at the Jefferson Medical College in 1857. On the outbreak of the Civil War he became a surgeon of volunteers, acting as medical director in various departments until 1865. In 1882, on the retirement of his father, he was elected one of the professors of surgery in Jefferson Medical College. He made numerous contributions to surgical literature in the journals, published a treatise on Tumors of the mammary glands in 1882, a treatise on Impotence and sterility in 1881, and assisted his father in the preparation of the various editions of his System of Surgery. He was a bold yet careful operator and an earnest and eloquent lecturer.

Joseph Pancoast (1805–82), a native of New Jersey, graduated at the University of Pennsylvania in 1828. He began teaching practical anatomy and surgery in 1831. In 1838 he was elected professor of surgery in the Jefferson Medical College; in 1847, professor of anatomy in the same college. He published his *Treatise on operative surgery* in 1844 (3d ed. 1852). He was distinguished for his operations in plastic surgery, especially for exstrophy of the bladder; devised the operation of section of the third branch of the fifth pair of nerves at its issue from the base of the skull, and of the second branch of the fifth pair at the same place; was a skilled anatomist, a dexterous operator, and a popular clinical teacher.

Henry H. Smith (1815–90), a native of Philadelphia, graduated at the University of Pennsylvania in 1837, after which he studied in London and Paris. He became professor of surgery in the University of Pennsylvania in 1855, and resigned in 1871. His *System of operative surgery*, published in 1853 (2d ed. in 1856), contains a valuable history of surgery in the United States, with an index of the principal contributions of American writers on subjects connected with operative surgery down to the year 1854.

Francis Fontaine Maury (1840–79), a native of Kentucky, graduated at Jefferson Medical College in 1862; performed the first operation of gastrotomy in this country, excision of the brachial plexus for painful neuroma, operation for exstrophy of the bladder, and two operations for extirpation of the thyroid gland. He was surgeon of the Philadelphia Hospital.

Dr. D. Hayes Agnew (1818–92), a native of Pennsylvania, graduated at the University of Pennsylvania in 1838. In 1852 he became the head of the Philadelphia School of Anatomy, to which he soon added a school of operative surgery; in 1863 he left this to become demonstrator of anatomy in the University of Pennsylvania, in which he became professor of clinical surgery in 1878 and professor of surgery in 1871. A highly-skilled anatomist, an unusually dexterous operator, and a keen, shrewd diagnostician, he acquired an immense practical experience in all forms of surgical affections and treatment, which he embodied in his treatise on the *Principles and practice of surgery*, published in three large volumes in 1878–83, and again in a second edition in 1889. He was one of the few great surgeons who have continued to

practise medicine as well as surgery until the end of their career, and he did this because he believed it made him a better surgeon.

J. L. Atlee (1799–1885), a native of Lancaster, Pa., graduated at the University of Pennsylvania in 1820, and practised at Lancaster throughout his life. In 1843 he revived the operation of ovariotomy, and with his brother established it on a firm basis. He was the first successfully to remove both ovaries at one operation.

Washington L. Atlee, his brother (1808–78), was a pupil of George McClellan, and performed his first operations for ovariotomy in 1844. This operation he performed three hundred and eighty-seven times, and had more influence in popularizing it than any other man in this country. His most important contribution to literature is on the diagnosis of ovarian tumors, published in 1873. He was also celebrated as an operator for the removal of uterine tumors.

Jonathan Knight (1789–1864) studied at the University of Pennsylvania, and became professor of anatomy and physiology in the Medical Institution of Yale College when it was organized in 1813. In 1838 he became professor of surgery, and held the chair to the end of his life.

Paul F. Eve (1806–77), a native of Georgia, graduated from the University of Pennsylvania in 1828. He studied several years in Europe, was a volunteer surgeon in the Polish Rebellion of 1831, and became professor of surgery in the Medical College of Georgia in 1832, in Louisville University in 1849, in the Nashville University in 1850, in the Missouri Medical College of St. Louis in 1868, and professor of operative and clinical surgery in the University of Nashville from 1870 to the date of his death. He published *A collection of remarkable cases in surgery* (Philadelphia, 1857)—a most useful and interesting work, and it is highly desirable that a similar collection should be made for the latter half of this century.

George C. Blackman (1819–71), a native of Connecticut, graduated in medicine at the College of Physicians and Surgeons, New York, in 1840, and for the next ten or fifteen years was engaged in study in Great Britain and in France, and as surgeon of an Atlantic packet-ship; in 1855 he became professor of surgery in the Medical College of Ohio. He was a skilful diagnostician and anatomist, a bold surgeon, an excellent clinical teacher, and thoroughly at home in surgical literature. He contributed largely to periodicals, re-edited Mott's edition of Velpeau, and translated the work of Vidal on *Venereal diseases*, but left no monograph or systematic treatise.

Charles Pope (1818–70), professor of surgery in St. Louis, Mo., in 1847, was distinguished as an operator and teacher, but wrote very little.

Elias Samuel Cooper (1823–62), a native of Ohio, studied medicine in Connecticut when very young; began practice at nineteen years of age, soon after which he excised a large portion of the lower jaw, and at the age of twenty-three opened a dissecting-room in Peoria, Ill., and gave lectures on anatomy. In 1855 he removed to San Francisco, and in 1858 was one of the founders of the Medical Department of the University of the Pacific, in which he became professor of anatomy and surgery. He performed a number of the greater surgical operations, twice ligated the innominate artery, twice performed Cæsarean section, and repeatedly

operated for ovarian tumors. One of his most celebrated operations was the removal of a piece of iron an inch long and three-quarters of an inch thick, which the explosion of a gun-barrel had driven into the chest beneath and behind the heart, and which had remained there over two months. His contributions to the literature of surgery are found entirely in periodicals.

Robert Nelson (1794–1873), a native of Canada, became distinguished as a surgeon in Montreal, and especially as a lithotomist; implicated in the rebellion of 1837, he came to the United States, for a short time filled the chair of anatomy and surgery at Castleton, Vt., and Pittsfield, Mass.; went to California in 1849, and finally settled in New York. He is the author of a pamphlet, *Gastrotomy for the removal of non-malignant tumors from the abdominal cavity* (New York, 1864), and of papers in the journals, especially in the *Northern Lancet*, of which he was the editor from 1850 to 1856.

John T. Hodgen (1824–82), a native of Illinois, professor of anatomy in the Missouri Medical College in 1852, and professor of clinical and military surgery in 1872, made valuable contributions to methods of treatment of fractures, and his splint is well known.

George Alexander Otis (1830–81) was a native of Boston, and graduated in medicine at the University of Pennsylvania in 1851. He studied in Paris, entered the army in 1861, was curator of the Army Medical Museum, and wrote the first two surgical volumes of the *Medical and surgical history of the war of the rebellion*, using the vast material in a thoroughly scientific manner.

Moses Gunn (1822–87), a native of New York, of Scotch descent, settled at Ann Arbor, Mich., became professor of anatomy and surgery in 1850, and professor of surgery in Rush Medical College in 1867, succeeding Brainard. He was a skilled anatomist, a popular teacher, and wrote a valuable paper on reduction of dislocations by manipulation.

John M. Carnochan (1817–87), a native of Savannah, Ga., a pupil of Valentine Mott, a surgeon in New York City, was a daring operator. He excised the entire lower jaw in 1851 and in 1864, removed Meckel's ganglion and the superior maxillary nerve in 1856, and ligated the femoral for elephantiasis in 1851. Besides journal articles he was the author of *A treatise on . . . . congenital dislocations of the head of the femur* (New York, 1850, 8vo) and *Contributions to operative surgery and surgical pathology* (New York, 1877–83, 4to).

Robert Alexander Kinloch (1826–91), a native of Charleston, graduated in medicine from the University of Pennsylvania in 1848, after which he studied in London, Paris, and Edinburgh. During the Civil War he was medical director on the staffs of Generals Lee, Pemberton, and Beauregard. In 1867 he became professor of materia medica and therapeutics in the Medical College of the State of South Carolina, and soon afterward professor of surgery, which position he held to the time of his death. He was the most prominent surgeon in his State, and was the first in this country successfully to excise the knee-joint for chronic disease and to treat fracture of the lower jaw by wiring the fragments. He was also the first surgeon to open the abdomen in cases of gunshot wounds in which there is no protrusion of the viscera. His contributions to surgical literature were entirely to medical periodicals.

Other surgeons well known in their own States were George Hayward (1791–1868), professor of surgery in the Harvard Medical School, who published some valuable surgical reports in journals and in a volume in 1865; Jacob Randolph (1796–1848), surgeon of the Pennsylvania Hospital, who introduced lithotrity in America; Horace A. Ackley (1812–59), professor of surgery at Cleveland, Ohio, 1843–56; Ely Geddings (1799–1878), professor of surgery in Charleston, S. C., the outlines of whose lectures were published in 1858; John Neill (1819–80), professor of surgery in the Philadelphia College; Ernst Krackowizer (1821–75), a native of Upper Austria, who came to New York in 1850, and was surgeon of the Brooklyn City Hospital; Julius F. Miner (1823–86), professor of surgery in Buffalo; Joseph C. Hutchinson (1827–87), professor of surgery in Brooklyn; and Josiah C. Nott (1804–73), professor of surgery at Mobile, but better known as a writer on ethnology.

The history of surgery in the United States has been told by Gross (*Am. Jour. Med. Sc.*, N. S., lxxi. 1876, 431), and its triumphs in the way of first operations have been set forth by Dr. Dennis (*Medical Record of New York*, 1892, xlii. 637–648), and to these papers the reader is referred for details which there is not space here to give.

In addition to anæsthesia, ovariotomy, and the foundation of modern gynæcology, American surgeons have contributed much to the art in the way of perfecting apparatus for the treatment of fractures by extension; of reduction of dislocations by manipulation; of the treatment of diseases of the hip and spine; of the ligation of large blood-vessels; of the removal of tumors; of the surgery of the brain, spinal cord, mouth, jaws, kidney, liver, and urinary organs. It is true that the scattered, unreported "first cases" of some of the great operations by early American physicians must be considered as entitling the individual to praise for his boldness or ingenuity rather than as "contributions to surgery," because it is not until such procedures have been made known to the profession and become a part of surgical literature or teaching that they have become useful; but from the beginning of the history of the art we find that the majority of the "first operations" of all kinds have been made, not by distinguished professors and famous authors, but by men who were neither teachers nor authors, and the names of many of whom are unknown to this day. This is true of amputations, lithotomy, herniotomy, trephining, excision of the breast, ligation of a wounded artery, Cæsarean section, hysterectomy, ovariotomy, and of the invention of many of the primitive forms of some of the most important instruments of the present day. "Les petits prophets," as Verneuil styles them, are worthy of all honor, and one of the objects of a history of surgery is to keep their names at least from being forgotten. American surgeons have contributed at least a fair share to the common stock of knowledge in the past, and it seems probable that they will do still more in the near future. They have been, for the most part, "practical men:" it is only within the last twenty years that the scientific problems of surgical pathology have been the subject of experiment and study in this country, but it is quite probable that the John Hunter or Joseph Lister of America is now busy with his preliminary work.

A most important step in the progress of medicine was made when physicians and surgeons began to form associations and societies for the purpose of mutual improvement and for the publication of papers read before them, rather than for guarding trade interests; and the transactions of such societies form a most valuable section of medical literature. The first of these societies which was devoted specially to surgery, and whose publications were important, was the Académie royale de chirurgie, the memoirs of which appeared in 5 quarto volumes (Paris, 1743–74, and again in 15 vols. 12mo, Paris, 1771–87, in 5 vols. 8vo, Paris, 1819, and in 3 vols. 8vo, Paris, 1838).

The *Mémoires* and *Bulletins* of the Société de Chirurgie de Paris, published from 1847 to the present time, and forming 52 volumes; the *Verhandlungen* of the Deutsche Gesellschaft für Chirurgie, in 35 volumes, 1872–93; the *Transactions* of the American Surgical Association, in 10 volumes, 1883–92; and the *Procés-verbaux, mémoires, etc.* of the Congrès français de Chirurgie,—are the most important of the purely surgical publications of this class in the present century. No surgical association publishing professional reports has existed in Great Britain, the Royal Colleges of Surgeons of Edinburgh, of England, and in Ireland not having undertaken this line of work.

The following is a list of the most important journals devoted especially to general surgery, arranged in order of date:

Chirurgische Bibliothek, von August Gottlieb Richter, 1771–96, 8vo, Göttingen u. Gotha.

Journal de Chirurgie, par Pierre-Joseph Desault, 1791–92, 8vo, Paris.

Bibliothek für die Chirurgie, Hrsg. von C. J. M. Langenbeck, 1805–13, 8vo, Göttingen.

Neue Bibliothek für die Chirurgie und Ophthalmologie, Hrsg. von C. J. M. Langenbeck, 1815–28, 8vo, Hannover.

Journal der Chirurgie und Augen-Heilkunde, Hrsg. von C. F. Graefe und Ph. von Walther (quarterly), 1820–50, 8vo, Berlin.

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SURGICAL PATHOLOGY, INCLUDING INFLAMMATION AND THE REPAIR OF WOUNDS.

By W. T. COUNCILMAN, M. D.

I. INFLAMMATION.

Inflammation is one of the most important subjects in medicine and surgery, and one of the most difficult to comprehend. It has played an important part in the history of medicine, and most of the theories of disease formerly held were more or less based on conceptions of its nature. It is only in comparatively recent years, when patient observation and experiment have taken the place of theory, that the true nature of inflammation has been better understood.

Were we to take up all the phenomena of inflammation and study each process fully, it would practically include all pathology. So extensive is the subject, and so intimately is it related to other pathological processes, that it has recently been proposed to abolish the term "inflammation" entirely, and to consider the various phenomena under other divisions of pathology where they naturally belong. The phenomena of inflammation are closely connected with the pathology of the circulation, with the degeneration and regeneration of tissue, with the action of bacteria, with injuries, etc. Still, it is well to have some one term to include the tissue-changes following an injury, and we may define inflammation as the sum of the phenomena which take place in the tissue as the effect of an injury. The object of these various phenomena is to overcome or to diminish the effects of the injury. The study of inflammatory processes may be well begun with the changes which take place in the blood-vessels, and in the connective tissue, which everywhere stands in close connection with these.

It will be well to consider the character of the normal connective tissue and the relations which it has with the circulation. The connective tissue in the body serves the important function of binding together the various parts, and acts as a support to the blood-vessels, which, with this tissue, grow into the various structures in the course of development. The connective tissue varies in its structure. It is composed of cells and of fibres which differ in their physical and chemical qualities. In places the fibres are loosely connected together, as in the areolar tissues, and in places they are compacted in close bundles, as in the tendon. The number of blood-vessels in this tissue varies greatly in the different parts of the body, the number standing in exact relation to the importance of the adjacent epithelial structures. Most of the blood-vessels in the connective tissue do not serve the purpose of its

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